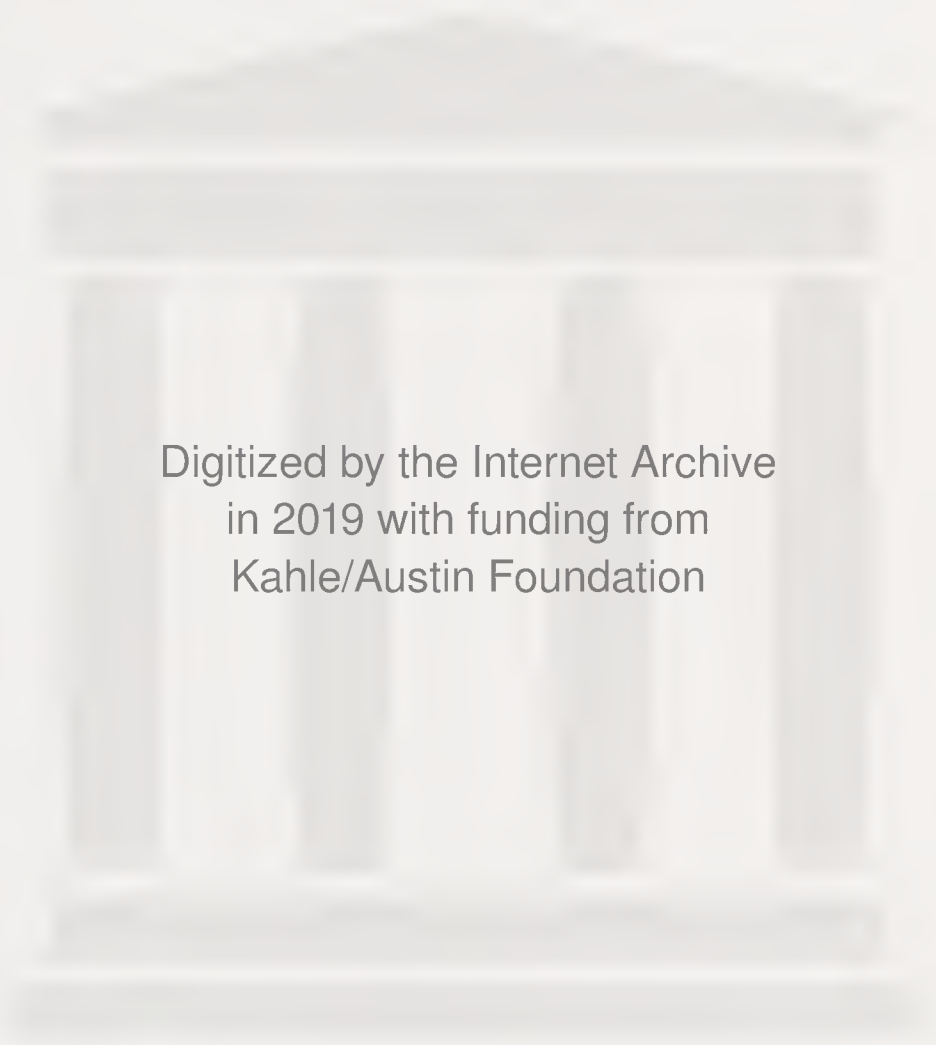


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THE BATTLESHIP

*Being the Story of the Greatest Naval Weapon
From the First Ship-of-the-Line
To Present-day Leviathans*

BY
WALTER WOOD

AUTHOR OF
"WITH THE FLAG AT SEA" "NORTH SEA FISHERS AND FIGHTERS"
"MEN OF THE NORTH SEA" ETC.

WITH 103 ILLUSTRATIONS BY
FRANK H. MASON, R.B.A.
AND FROM ENGRAVINGS, PLANS, AND PHOTOGRAPHS



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INTRODUCTION

I BELIEVE there is no book in our language which deals solely with the battleship, both sail and steam. I have tried to write one, and to show in it the development of the latest costly, complicated, and destructive mammoth from the gorgeous but crude and almost harmless vessel which was our first ship-of-the-line and amazed the world—that in which Henry the Eighth voyaged to the Field of Cloth of Gold.

A work which dealt only with ships must have been somewhat tedious, for much technical detail would have been essential, and I had neither the wish nor the qualification to provide it. I desired to show what the old ships-of-the-line were, how they were manned, how they behaved, and what life in them meant; and I hope that I have done at least this. I wanted also to indicate the incessant sacrifices which officers and men have made for England, and to show how, in spite of shameful neglect and parsimony, the ships-of-the-line were kept serviceable by their people, and how these bulwarks of the Navy have preserved the nation.

The ship-of-the-line has been the chief factor in our centuries of naval supremacy, and the battleship to-day

has succeeded her. The battleship has been from the earliest days of the Navy associated with our most famous seamen and our greatest triumphs. Her history is that of the Navy, and further sea records will depend on the battleship, unless machines of combat are revolutionised before another naval war occurs.

In writing a book of this character help was necessarily needed from such recognised sources as Charnock, Fincham, Derrick, James, and Nicolas, but numerous manuscripts, memoirs, and autobiographies have been consulted in relation to the days of sail. For the modern part of the volume assistance has been gained from many quarters, and acknowledged in its place, but details have been largely drawn from official publications. One or two private firms have been most helpful, and I am specially indebted to Sir. W. G. Armstrong, Whitworth & Co., Ltd.

The warlike deeds of the battleship relate almost exclusively to the days of sail; romance and peril also are principally associated with the old ship-of-the-line. For these reasons I have devoted most of the book to the fascinating period of oak and canvas, while endeavouring to deal adequately with the achievements of steel and steam. I have attempted only to give a broad survey of men and vessels in so far as they concern the wooden walls and the gigantic modern steel battleship.

There is little to guide us as to the probable result of a meeting of these mammoths; there is no sane and

humane being who is not content to let glory remain associated with the brave, enduring days of sail. It may well be that we have reached a stage when all the nations must say "Halt!" in connection with battleship construction and naval expenditure.

SUBMARINED

I

CRAFT of brain and skill of hand,
Wealth of Indies, flowing free ;
Ant-like work of human band
Toiling by a land-locked sea ;

Roar of furnace, hiss of flame,
Mounds of metal, molten white ;
Supervision ceaseless claim,
Morn to noon and noon to night.

Gold and steel and brain and hand—
What of all and each to say ;
Welded metal on the land,
Earnest labour night and day ?

What is rising by the shore,
Resting on the mighty slip,
Growing daily slowly more ?
'Tis a mammoth battleship.

II

From a mass of metal red
Human hands in many days
Bring to being, grim and dread,
Lord of All the Waterways.

Grey and solemn on the wave,
Vast of beam, immense of length ;
Coldly scorning death and grave—
Citadel of monster strength.

III

Darkened sky and troubled sea,
Thunder-crashing sound in air;
Massive citadel—was she
Such a thing as founders there?

IV

Toil of hand and pride of heart,
Master work of human brain—
Rent asunder, burst apart—
Back to shapeless steel again.

THE BATTLESHIP

CHAPTER I

THE FIRST OF BRITISH BATTLESHIPS

THE Royal Navy, the most splendid and impressive war-machine the world has ever known, was founded more than four centuries ago. It began with Henry the Seventh—the “poetic dreamer” whom Green describes as a literary and artistic man, a patron of the new printing-press, and a lover of books and art; yet that vivid historian neglected to remind us that he laid the basis of the present mighty fleet.

It is well to say what letters have accomplished for the English people; but as needful to remember that what we are we mostly owe to that valiant fighting force which for many generations knew nothing of, and cared less for, the profession of literature; was pressed, deceived and sentenced into service afloat; flogged into discipline, starved and robbed, neglected and despised—and yet made England what she is. The ship-of-the-line was repeatedly the salvation of the country, and when the time of naval conflict comes again, the issue, doubtless, will be settled by the battleship.

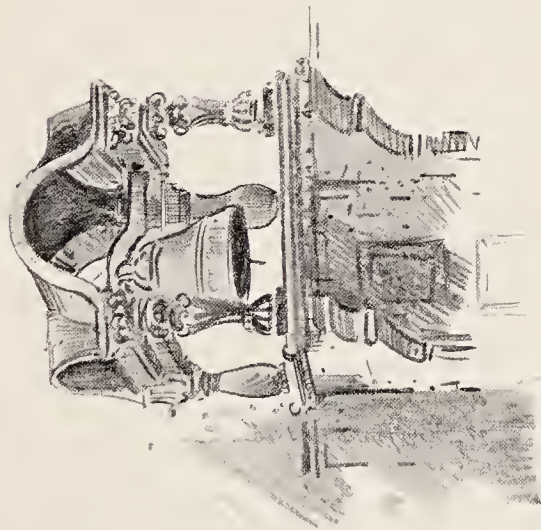
Gorgeous decorations and terrifying names of ordnance were almost the chief characteristics of the

battleships of the early British Navy; yet the vessels filled the minds of the simple people of the day with awe.

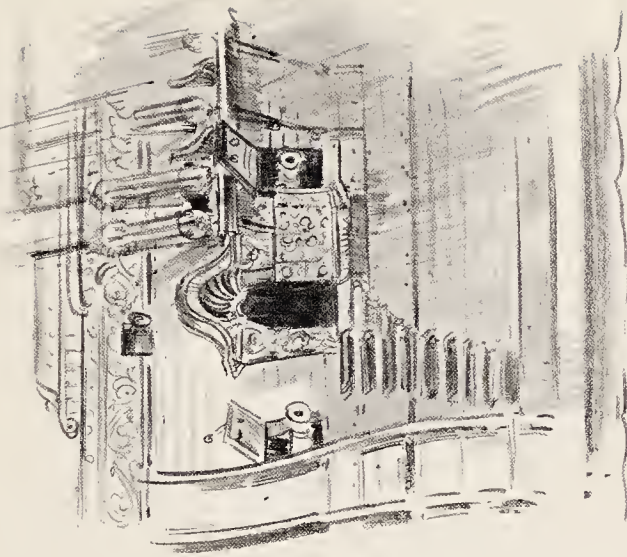
"There came Carracks horrible, great and stout," sang the poet who described the Navy which Henry the Seventh established; but just four hundred years ago—in 1512—the biggest ship that existed was of only a thousand tons. This was the *Regent*, which carried the Lord High Admiral's flag and 700 men. The next largest ship was the famous *Mary Rose*, which met the same fate as the *Royal George*, and at Spithead, too, where Kempenfelt went down, "with twice four hundred men."

There are still in existence guns which were recovered from the wreck of the *Mary Rose* after they had been under water for nearly three hundred years. One is at Portsmouth, another is in the Royal United Service Museum. In connection with the latter it is related that when the salvage operations for raising the weapon were in progress in 1836, two of the divers quarrelled while under water, and one of them kicked in the glass eye of the other's helmet. Theoretically the damaged headdress should have caused the death of the wearer by drowning him; but he was hauled to the surface and found to be little the worse for the blow of the lead-loaded boot.

In 1512 the "great ships," or "ships royal," as vessels of 200 tons and more were called, numbered only six. Next in size to the *Regent* was the *Mary Rose*, with her 500 tons; the *Peter Pomegranate*, *John Hopton's Ship*, the *Nicholas Reede*, each of 400 tons; and the *Mary George*, with a tonnage of 300. The *Regent* was copied from a French ship, setting the



OLD BATTLESHIP'S BELFRY.



ENTRY PORT 18TH CENTURY SHIP.

example which was followed long afterwards by British naval architects, who found in captured French prizes suggestions for the finest ships that ever belonged to the British Fleet in sailing days.

Henry the Seventh had lived long in Bretagne and had gained a knowledge of maritime affairs which few of his predecessors had possessed. France even at that remote period had a considerable fleet of men-of-war, the largest of which, a carrack called the *Marie la Cordelière*, the Admiral's ship, carried 1200 fighting men, excluding mariners, of whom, in action, she had on board 900. Crowded within her wooden walls, therefore, were more than 2000 soldiers and sailors, so that battle became a butchery.

In August, 1512, when Henry the Eighth had come to the throne, the English and French fleets met in Bretagne Bay and fought a "cruel battle." In this the *Regent* and the great carrack of France were grappled together, and were burnt, the two ships losing by fire, water, and weapons, 1600 men. To replace the loss of the *Regent* Henry commanded that there should be constructed a greater ship than had ever been seen in England, and that she should be called the *Henry Grace à Dieu*. She was built at Erith, and launched in 1515, and is commonly known as the *Great Harry*.

On a Tuesday in mid-June, 1514, Henry went on board his new ship, "which was that day dedicated with great triumph." He was accompanied by the Queen, the Princess Mary, the Pope's ambassadors, several bishops and a large number of nobles. Proud of his splendid creation, Henry conducted his guests through the ship, which, said one of the visitors, "has no equal

THE BATTLESHIP

in bulk, and has an incredible array of guns, with a scuttle on the top of the mainmast, 80 serpentine and hackbuts. The ship contains seven tiers, one above another." On the ambassadors leaving the ship a salute was fired from all the guns; a slow and unimpressive demonstration, to the modern way of thinking.

The *Henry Grace à Dieu* was a noble and imposing ship of war, for her day and generation. Her cost was considered enormous, before she was ready for sea, with her provisions and stores. Contemporary accounts were kept of the expenses of building, fitting, victualling and manning her. The first-named items are interesting enough to be set out in detail. They were:—

	£	s.	d.
Timber, etc., 1752 tons	437	17	7 $\frac{1}{4}$
Wrought and unwrought iron	408	19	7 $\frac{1}{2}$
Brass, etc.	243	6	3 $\frac{1}{2}$
Coal for the iron	133	12	6
Cordage	969	2	11
Ox-hair, lime, rosin	100	13	10
Blocks, pullies, etc.	63	0	19
Spades, platters, tankards, etc.	155	13	10
Lathes, painting colours	36	0	7
Bedding for the workmen, watchmen, etc.	296	9	2
Sundries	685	7	2 $\frac{1}{2}$
Total	3531	5	1 $\frac{3}{4}$

Amongst the wages items were:—

	£	s.	d.
Shipwrights and sawyers	185	16	7
Mariners employed in fetching timber	55	6	3
Masters' wages at 20s. a month.			
Quartermasters' wages at 10s. a month.			
Purser's wages at 8s. a month.			
"With others"	254	9	1 $\frac{1}{2}$

The sum of £1969 18s. 2d. was spent in victualling the ship; and of that total about £1600 went in the bread, beef and beer on which during the whole of the fighting period of England's Royal Navy the men lived, and fortified by which they won the greatest battles in naval history.

The victualling list of the *Great Harry* was as follows :—

	£	s.	d.
7497½ doz. and 2 loaves of bread . . .	370	7	8
1543 pipes and 2 kilderkins of beer . . .	526	19	11
557 beeves	706	17	9
205 score muttons	32	5	8
Porks	0	36	0
27 calves	0	75	0
9 barrels of beef	8	5	2
1001 quarters of lings	38	2	0
16 barrels of fish	8	10	0
4522 cods	87	2	10
45 salmons	0	30	0
10½ lasts and 2 cads of red herring . . .	54	0	12
19½ lasts 4½ barrels of white herring . .	88	18	10
20 cads of sprotts	0	24	8
4½ pipes of baysalt and 4 bz. at 26s. 3d. a pipe	...		
12 weys 7 bz. 1 peck of baysalt	13	7	6
7 barrels of butter	4	6	0
30 weys and 3 qrs. of cheese	19	4	0
White salt	0	0	13
Oatmeal, green and grey pease, eggs, etc. .	62	0	6

Decorations on a splendid scale were furnished for the *Henry Grace à Dieu*. John Brown, the King's painter, provided a large streamer for the mainmast, 51 yards long, embellished with Cadow fringe. For the shaping, sewing and workmanship of this £3 was charged. Further streamers were provided, not so

long, but quite as decorative, for the other masts of the ship; there were also ten banners of "tewke," beaten gold and silver, fringed with silk, each $5\frac{1}{2}$ yards long, 40s. apiece; ten flags with Crosses of St. George, the shaping, sewing and fringing of which came to the moderate cost of 10d. each; then there were seven banners of buckram, $2\frac{1}{2}$ yards long, with divers arms, staff and workmanship costing 8s. each. Sixty staves at 16d. each were supplied, sixpence being spent on each stave in the King's colours, so that they should be worthy of the splendid banners they supported.

Another painter, Vincent Pulp, by the King's command, furnished many additional streamers and banners for the *Great Harry*. There was a streamer with a dragon, 45 yards long, the fringe and workmanship costing £3; another dragon-decorated streamer, 42 yards in length, and costing 40s.; a streamer with a lion, 36 yards long; a streamer with a greyhound, 18 yards long; two "little streamers" with the Cross of St. George, one 20 and the other 12 yards long—a 60-foot display being apparently small compared with the 153-foot streamer for the mainmast; one hundred pencils at 12d. each; and fifty banners of tuke, wrought with gold and silver, 40s. each. The sums mentioned in connection with the *Great Harry* must be multiplied several times to estimate the present-day cost.

Brass guns and iron guns, iron shot and shot of stone and lead; serpentine powder and corn powder; sledges of iron and crows of iron, bows and arrows, pikes and darts; lime-pots—these and other "munycions" and "habillments for warre" comprised the "furniture" of the *Henry Grace à Dieu* when she was ready for service

—a ship of 1000 tons, with 349 soldiers, 301 mariners, and 50 gunners. Her brass pieces numbered 19 and her iron pieces 103, though the “furniture” account gives 21 as the number of “gonnes” of brass, these being:—Cannons, 4; demi-cannons, 3; culverins, 4; demi-culverins, 2; sakers, 4; cannon perers, 2; falcons, 2. The “gonnes of iron” were:—Port pieces, 13; slings, 4; demi-slings, 2; fowlers, 8; bassils, 60; top-pieces, 2; hail-shot pieces, 40; hand guns complete, 100.

We may smile at these quaint weapons; yet they were to the people of the days just preceding the Armada, when England was fighting for her life, exactly what the details are to us of such ships as the *Lion* and the *King George v.*, on whose efficiency Great Britain depends for existence.

The system of the period of the first of British battleships was to impress by show of pomp and wealth: the principle of our own time is to annihilate by overwhelming force. The *Great Harry* was a floating mass of millinery and gilded timber: the *King George v.* is an unadorned engine of wholesale death and dreadful havoc. The total cost of a single modern steel mammoth is equal to the cost of construction and maintenance of the whole of the Royal Navy of England during many early years of its existence. In one respect only does the existing warship keep touch with her progenitor, and that is her complement. The *Great Harry* carried almost as many people as a modern battleship.

There is a famous painting which represents the *Great Harry* sailing from Dover Harbour, when Henry the Eighth went splendidly to Calais for his interview with the French King Francis I. on the Field of Cloth

of Gold. According to this picture the ship had four masts, with two round tops on each, except the shortest mizen. The Royal Standard flew from each of the four quarters of the forecastle ; pendants streamed from the mast-heads, and at each quarter of the deck was the standard of St. George's Cross. Her quarters, sides and tops were decorated with shields and targets. On each side of the rudder was a port-hole with a brass cannon, and on the side of the main-deck were two port-holes with cannon and the same number under the forecastle. The figure on the ship's head was meant to represent a lion ; but it was extremely ill carved. The King is represented standing on the main-deck, dressed in a garment of cloth of gold trimmed with ermine, the sleeves, jacket and breeches being crimson. His round bonnet is covered with a white feather laid on the upper side of the brim. Courtiers, trumpeters and yeomen of the guard accompanied the sovereign. The uncommon form of the ship represented in the picture, wrote John Topham, in *Archæologia*, cannot escape observation. The vast height of the masts, the distance from the upper deck and stern gallery to the edge of the water, the shape of the forecastle and the quarter-deck, and the ornaments and decoration of the whole, exhibit a view extremely striking and unusual. The manner of building ships at this period was probably borrowed from the Venetians, who were then the leading naval power in Europe ; for they seemed to be "more adapted to the stillness of the Adriatic and the Mediterranean seas than to the rough and boisterous ocean of the Northern parts of Europe." In that respect at any rate Topham was wrong, for the Adriatic and the

Mediterranean are visited by notoriously dangerous weather.

Despite his pride in possessing the great ship, Henry the Eighth was not disposed to let her run needless risks, nor was he over ready to send her to sea unless there was urgent cause for doing so. She was largely a show ship; also something of a nuisance and a burden. Special dock accommodation had to be made for her at Portsmouth and her maintenance was a constant heavy tax on the Exchequer. Yet, according to the qualities of sailers of the time, the *Great Harry* was a fine vessel. In June, 1522, when Henry left Dover, she was forced back to the Downs by bad weather. Vice-Admiral Sir Thomas Fitzwilliam, writing to the King, said: "The *Henry Grace à Dieu* sailed as well and rather better than any ship in the fleet. She weathered them all, save the *Mary Rose*; and on a wind there would be a 'hard chose' between them. . . . All yesterday the wind 'blew sore and strainably,' but the *Henry* rode as still and gently at anchor as the best ship in the fleet." Yet even then, early in June, the admiral was consulting the wisest masters in the fleet about laying her up for the winter. When laid up, in the Thames, the *Great Harry* was in charge of the master and eleven mariners; but four men were enough to act as keepers of a ship as large as the *Gabriel Royal*, of 650 tons.

The ships of Henry the Eighth were almost helpless when the weather was bad, and the Navy suffered many losses. In November, 1544, Sir Thomas Seymour was compelled to put to sea, because the wind rose so high that such as were "not fast aboard the shore was fain to go run, of the which I was one . . . and it was

as much as we could do for our lives to get sight of the Eylle of Wyght before night. . . . Three hulks that came after me could not get sight thereof till they were in a bay on the East side of the Isle." One of these hulks "brake all her anchors and cables and she brake all to pieces on the shore and but 41 of 300 saved alive." His brother's hulk, the *Christopher*, went on the rocks and broke to pieces, but all the men were saved except three. Another new hulk which tried the seas that night "brake three of her beams and with much ado came into the Wyght." Seymour subsequently said that the *Jesus of Lubeck*, a good new hulk of 700 tons, could doubtless be bought for the King's Navy for four hundred pounds, as the owner would sell her at that price rather than rig her after her experiences in the gale. The *Peter* had her mast sprung, four ships had sprung leaks, and the *Dragon's* masts were "almost asunder."

Ships were bought for the King's service, and no great price was paid for them. The owner of the *Mary Hamborough*, for instance, was willing to dispose of her for £350.

An idea of a ship of Henry the Eighth's time is given by an owner of "a great barke" in 1531, in the form of an inventory as follows:—

The ship with one overtop. A summer castle, and a close timber deck of "last" from the mast forwards. Above the summer castle a deck from the mainmast afterward. A new mainmast of spruce, 25 yards from the "hounse" to the step, and 23 hands about the "patnes," with yards, sails and tackle. A main mizen mast, a bonaventure mast, and a foremast. An oak

bowsprit, four anchors. A pump with three boxes and three pump staves, three compasses and a running glass. A great boat and many other items.

Ordnance: Two brazen pieces called "kannon peyces," unstocked, weighing together 20 cwt. 28 lb.; two pair of shod wheels, two loading ladles. *Starboard side:* An iron port piece with two chambers; a port piece of iron with one chamber; a Spanish sling with one chamber. *Larboard side:* two port pieces. *In the forecastle:* A small sling with two chambers; another iron piece with two chambers; one broken.

Henry the Eighth established the first two of the Royal Dockyards, those at Deptford and Woolwich, and laid the foundations of the gigantic and impressive modern Royal Navy. There came into being a Lord High Admiral, and under him a Vice-Admiral of England, the Master of the Ordnance, Treasurer, Comptroller, Surveyor and Clerk of the Accounts, these being the principal officers of the Navy; then followed the Surveyor-General of the Victuals, Store-keepers, two Clerks of the Cheque, and other subsidiary officers. The principal officers helped and advised the Lord High Admiral in controlling the Navy.

With the regular establishment of the Navy began that system of stern discipline which lasted for nearly four hundred years, and, despite its barbarities and inhumanities, made the British Navy the magnificent and unrivalled war-machine which it is to-day. When Henry's fleet set forth no ship was to do anything without authority; no vessels except those appointed were to give chase, either to windward or leeward, on pain of death; every ship before sunset was to go under the lee

of the admiral to know what course he would keep. To every boat there was to be a quartermaster and boat-swain; and when a boat landed soldiers the crew and gunners appointed to defend the craft were not to leave it on pain of death. Punishment was ruthlessly inflicted at this period, and not long afterwards Drake ordered one of his officers to be beheaded for insubordination.

Henry was constantly at war with Scotland, which was then a separate kingdom and a cause of great anxiety and vexation to him. When he could no longer control his feelings with regard to that part of Britain, he sent an expedition which landed and occupied Leith, taking booty of the value of £10,000 and the two finest warships which Scotland possessed. These were the *Salamander* and the *Unicorn*, which were manned and put in order for Henry's Navy. Their ballast was cannon shot of iron, which was found at Leith, to the number of fourscore thousand. The *Unicorn*, one of these two "princely" ships, was almost equal to the *Mynyon*, and the *Salamander* was "as much as the Great Galley, or within very little, and fully as long." The *Salamander* was given by the French king at the marriage of his daughter into Scotland, and the *Unicorn* was built by the late Scottish king. The exultation arising from the capture of the *Salamander* was quickly cooled, because she was found to be in such decay that she could not be ready for three weeks, and even then "could not serve above two months."

Scotland in those days built and maintained ships which were as fine as any in the English Navy, indeed, one of them, the *Great Michael*, surpassed in some respects the *Great Harry*. The *Great Michael* was

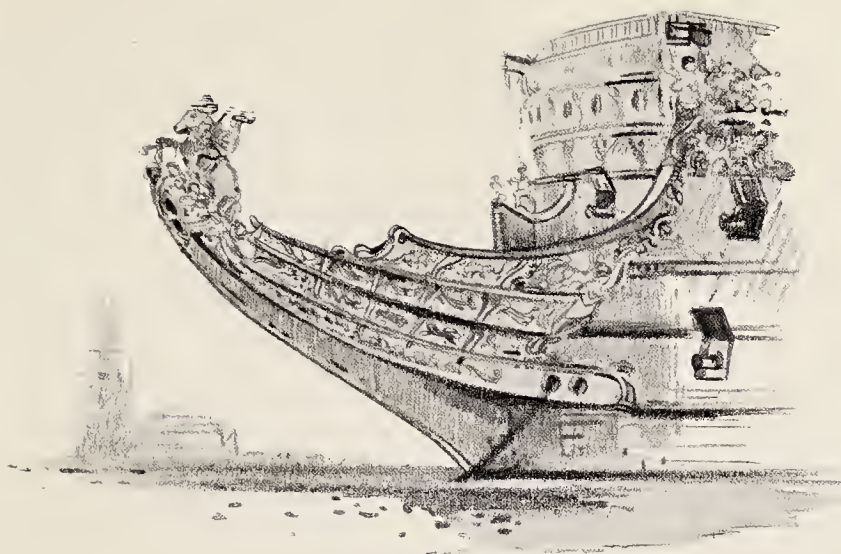
built by James the Fourth of Scotland, who was killed at Flodden in 1513. It was under the direction and encouragement of this monarch that the renowned Sir Andrew Wood, of Largo, developed the Scottish Navy with so much skill and success. A contemporary historian described the vessel as the largest and strongest that ever sailed from England or France. The ship was of such great stature, he states, and took so much timber, that, except Falkland, she "wasted all the woods in Fife, which were oak wood, with all timber that was gotten out of Norroway."

The *Great Michael* was 240 feet long and 36 feet "within the sides"; but her extreme breadth was 56 feet, for her sides were 10 feet thick, these being, indeed, the forerunner of armour-plates. No existing cannon could get through her, the historian declared, and none of the crude ordnance of the times could have penetrated the 10 feet thickness or a much less tremendous wall. The weapons were more impressive in name than nature. "She bore many cannons, six on every side, with three great bassils, two behind in her dock, and one before, with three hundred shot of small artillery, that is to say, myand and battered falcon, and quarter falcon, slings and pestilent serpenteas, and double dogs, with hagtar and culvering, crossbows and handbows." To work these affrighting instruments the *Great Michael* carried 120 gunners and 1000 men of war, with 300 mariners to sail her; that is to say, nearly 1500 officers and men found accommodation within the vessel's walls. A year and a day were spent in building the ship, "all the wrights of Scotland, yea, and many other strangers, being employed upon her. . . . This great ship cumbered

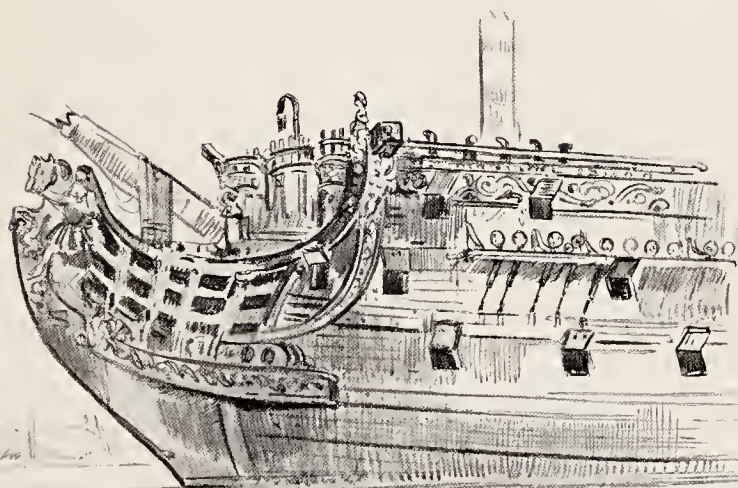
Scotland to get her to sea." The *Great Michael* cost £30,000 (equal to £300,000 of our own money), by far the largest sum that had ever been spent on a single ship of war. Except as a show creation she did not achieve distinction. Perhaps the very reputation she enjoyed terrified opponents and prompted them to give the formidable hulk a wide berth. Wood himself and Robert Barton were two of the chief officers. No records are given of the performances of the *Great Michael*, which, after an uneventful career, came to a peaceful and inglorious end.

Scotch and English warships were meeting constantly with varying fortunes. When the Scotchmen were victorious they drove hard bargains concerning the ransom of prisoners. There was a recognised market rate for transactions of this sort; but occasionally the Northern craving for a good profit prevailed, and captives found themselves in sorry straits. In 1532, for instance, four Scotch men-of-war took fourteen English ships and a "great Spaniard of 300 tons," laden with English goods. The Scotch ships were asked if the prisoners they had taken could be ransomed, "after the old custom of the sea," at 20s. a mariner and 40s. a master; "but they will put none to ransom," a proceeding which caused the bewildered chronicler to declare that he did not know what they meant by it. These misunderstandings occurred from time to time, to disappear only when England and Scotland became a united kingdom.

It was the custom during Henry's reign, as it had been for some time, to name the principal ship of the day after the reigning monarch; hence the calling of



BEAK HEAD, 17TH CENTURY.



BOW OF BATTLESHIP, EARLY 18TH CENTURY.

this vessel the *Henry Grace à Dieu*. Almost as soon as Henry died her name was altered to *Edward*.

Earnest efforts had been made to give the Royal Navy the most splendid and powerful ship of the age; but when the *Great Harry* was destroyed by fire no attempt was made to replace her and the Navy was permitted to decay. So complete was the neglect, that, excluding the *Great Harry*, the number of ships had decreased by a score, half the strength of the Navy, and that, too, within a period of four years. During the reign of Queen Mary the Navy was still neglected, so that on the accession of Elizabeth many of the ships which nominally composed the Navy were utterly unfit for service.

At this period the following wages were paid per month:—Master, £2; boatswain, 16s. 8d.; master gunner, 10s.; stewards and cooks, 9s. 2d.; mariners, 6s. 8d.; shipwrights, caulkers and sawyers, £1, 8s.; purser, 6d. daily.

These figures varied from the rates which ruled during the war in 1514. A vice-admiral was then paid 10s. a day; a captain, 18d.; soldiers, mariners and gunners, 5s. a month and 5s. victuals; “rewards” were paid to the master gunner, 5s. a month; his mate and four quartermasters, 2s. 6d. a month; thirty-four other gunners, 20d. apiece; two clerks to the admiral, 8d. a day. Captains’ and soldiers’ coats cost 4s. each, and the coats of mariners and gunners, 20d. each.

With the founding of a Royal Navy and the building of big ships manned with large crews there began that series of disasters in time of peace which human foresight cannot prevent. Ever since the British fleet

first came into being there have been the tragedies of peace which have caused far greater consternation than the ravages of war. In time of conflict it is natural to look for heavy losses, both in ships and men; but when countries are at peace their peoples are unready for calamities such as that which marks the beginning of the Navy in the sinking of the *Mary Rose* and the innumerable dreadful losses which have taken place from time to time, down to the appalling destruction of H.M.S. *Victoria*.

The *Mary Rose* was lost in 1545, when England was again at war with France. By that time the English fleet consisted of about 100 sail, of which the *Mary Rose* was one of the largest, with 500 or 600 men on board. The enemy were about to attack Portsmouth, and the English ships at Spithead were moving out to meet them. The *Mary Rose* was very low in the water, and when her helm was put hard over she heeled so much that her lower ports, which were open, and only sixteen inches above the water, were submerged. The water rushed in so heavily and swiftly that the ship filled and sank before her people could attempt to escape. Of all on board only about thirty-five persons were saved. Numbered with the lost was Sir George Carew, her captain. The disaster was clearly seen from the shore, where, amongst the spectators were the King and Lady Carew, the captain's wife. The *Henry Grace à Dieu* nearly met the same fate; but her people prevented her from capsizing. For eight more years she remained afloat, then, on 27th August 1553, the first year of the reign of Queen Mary, she was totally destroyed by fire at Woolwich.

The life of the *Great Harry* had been long and full of action. That she was well and honestly built is shown by her forty years' existence—she would doubtless have been in use for many more years if her career had not been ended by fire. She was our first great battleship, crude and unwieldy, yet originating that noble type of ship-of-the-line which with all her faults was such a splendid mistress of the seas. She was the forerunner of ships which were soon to meet and vanquish the Most Happy and Invincible Armada, and even she was to witness revolutionary changes in the Navy. The greatest of these was the introduction of port-holes. Until the beginning of the sixteenth century, guns, small and few in number, had been placed on deck, in convenient positions. The *Henry Grace à Dieu* had them on both decks and on the half-decks, as well as forward and aft; indeed, she had an all-round fire, although the ports were merely round holes in square spaces through which the muzzles of the guns could be thrust, without the possibility of doing more than shooting straight ahead.

To France we owe the advantage which ports gave to the earliest battleships, for port-holes and other improvements were invented in 1500 by a Brest ship-builder named Descharges. These round ports existed till the time of the Commonwealth, when they had become highly ornamental.

CHAPTER II

THE CRADLE OF THE BATTLESHIP

LONDON RIVER was the cradle of the battleship. The first great ship of England which was able to take her place in the line of battle was born on the banks of the Thames, and there she perished in a blaze of glory. From the time of that romantic vessel onward, yards at Woolwich, Deptford, Sheerness, and Chatham gave to the British Navy some of its most famous fighting ships; and even now a mammoth battleship, the *Thunderer*, has been completed on our greatest waterway. The most famous of all battleships, the *Victory* and the *Royal George*, were built on the Thames, Nelson's ship at Chatham and Kempenfelt's at Woolwich. Those are two only of the great fleet of noble vessels which from generation to generation were added to the British Navy from what are practically Metropolitan dockyards.

From the time when Henry the Eighth established the Royal Dockyards at Deptford and at Woolwich until to-day, battleships have been laid down, launched, and broken up on the banks of London River. In one direction or another the waterway has kept abreast of naval development, although she is fighting just as much for recognition of her rights as the Second Chamber. There are those who say that the Lords

are useless and have had their day; there are men who declare that the battleship-producing power of the Thames has departed, and that for purposes of naval construction London River must take second place, or no place at all, in comparison with the wonderful and vast organisations on the Tyne, the Clyde, and at Barrow. However much truth or fairness there may be in such representations, it must be remembered that the Thames was the home of ships which have in various ways marked revolutionary periods in the history of the world's navies.

London River gave to Britain her first great battleship, the *Henry Grace à Dieu*; the *Sovereign of the Seas*, the first three-decked ship built in England; the steamship *Rattler*, whose success decided the universal adoption of steam propulsion in the Navy; the *Warrior*, first of all sea-going iron-built armoured vessels; the *Monarch*, the first sea-going turret ship, and the *Benbow*, which carried the biggest guns—two 16-inch 110-ton weapons—ever mounted in a British ship of war. The *Benbow* was followed by the *Sans Pareil*, the unfortunate *Victoria's* sister; also carrying a pair of 110-ton guns; but both were mounted in one revolving turret forward, while the *Benbow's* were placed in separate barbettes, one forward and one aft. At one time there were under construction on the river, by the Thames Ironworks and Shipbuilding and Engineering Company Ltd. alone, no fewer than four first-class battleships—the *Albion*, the *Shikishima*, the *Duncan*, and the *Cornwallis*.

When Henry the Eighth had laid the foundation of the Royal Navy, established the constitution of

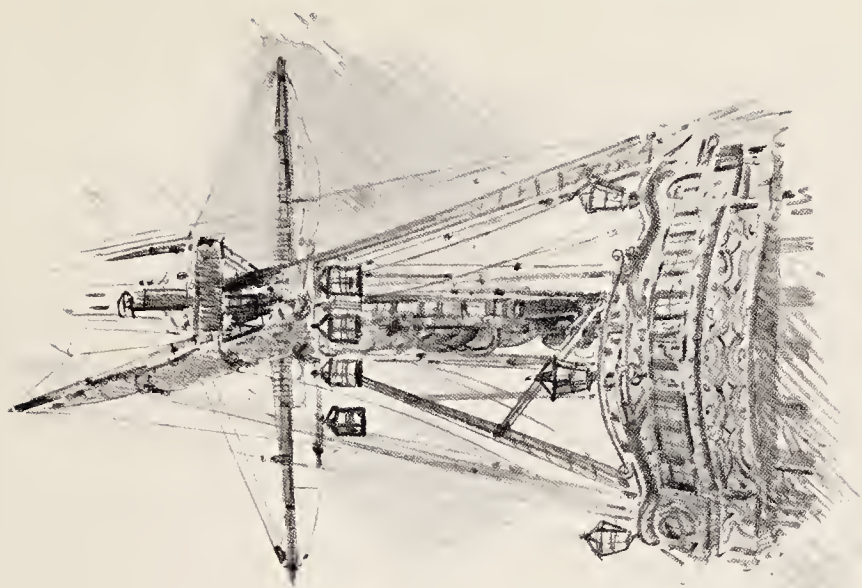
the British fleet which exists to-day, put the pay of officers and men on an assured basis, and made sea-service a regular profession, there began the era of the battleship, as distinct from vessels of all other classes. From the day he went on board the *Great Harry* until our own time, there has been no relaxation in the efforts to evolve a perfect fighting machine on which the supreme issue of a maritime engagement should depend. In its essential principle the battleship of to-day is what it was in the beginning, an enormous floating platform capable of supporting guns which shall do the maximum of damage, both in ship and life, and fulfil the task of killing, crushing, and destroying.

With the coming of the battleship era there arose many of those mysterious and bewildering customs which remained associated with the Navy till a recent period. One of the first things done by Henry was to make the allowances of which some details have been given; but in addition to these there were further payments known as "dead-shares." All ranks profited in these allowances, which varied from fifty shares for an admiral to a half-share for the cook's mate. Dead-shares were equivalent to fictitious numbers borne on the complement. The system was bad in principle, and gave rise to serious abuse.

Woolwich was the birthplace of the *Great Harry*, and there her timbers became ashes. The whole of the earliest battleships, indeed, were built on the Thames, either at Deptford or Woolwich. At the time of Henry's death in 1547, the Navy consisted of seventy-one vessels, of which thirty were "ships of burthen," that is to



BOW OF MODERN BATTLESHIP.



STERN LIGHTS AND SIGNAL LAMPS.

say, of some considerable dimensions ; but their total tonnage was not more than from 10,000 to 12,000—much less than that of a single battleship to-day. The *Great Harry* was then at Woolwich, “being far greater in armament and complement than any other ship in the Navy.” The next to her in size were the *Jesus*, of 700 tons, the *Peter*, and the *Matthew*, each of 600.

There is no *Jesus* in the British Navy now, nor ships bearing the pious names of the Apostles, with many others of a kindred sort ; but there was in Henry’s Navy a *Lion*, predecessor of one of the most gigantic ships in our fleet to-day. The *Tiger*, the *Bull*, the *Salamander*, the *Unicorn* and the *Dragon* figured as consorts of the *Great Harry* ; but some of the fine old names have long since disappeared.

That river-born fleet was in all respects a modest one. The entire tonnage was given as 11,268 ; the number of soldiers, mariners, etc., 7731 ; pieces of brass ordnance, 237 ; and of iron, 1848. The complete cost of maintenance of this fleet for a month, in wages and victuals, as a “summer guard,” was £1361 1s. 8d., of which more than half was for victuals ; and for the “winter guard,” £1175 7s. 4d., of which more than half also represented victuals.

From a state of readiness and soundness the Navy which had come so quickly into being fell away as rapidly when the powerful monarch was succeeded by the child of nine years—Edward VI.—who lived as nominal ruler only for six and a half years ; nor were matters better in the reign of Mary ; indeed, so much did the Navy deteriorate that only 21 ships were included in it, with a total tonnage of 4380, manned by 3182 soldiers, mariners,

and gunners. It was calculated that £10,000 a year would answer all necessary purposes in repairing and victualling the fleet. When Mary died there were not more than 26 ships and vessels, with a tonnage of 7110, and 3565 men. Wages and "dead-shares" came to £1436 a month and victuals to £1782 10s. od.

Elizabeth succeeded to the throne at the age of twenty-five years, and it needed all the strength and enthusiasm of her masterful nature to repair the ravages which had been caused in the fleet by the neglect and incapacity of her immediate predecessors. She took up the work where her father had left it, and by zealous personal endeavour and sagacious foresight, aided by the wisdom of her counsellors, she resurrected the Navy. London River became a favourite haunt, and the building, equipping and manning of ships an earnest object of accomplishment.

Merchants had long built vessels which, while designed chiefly for trading purposes, could be swiftly converted into fighting ships. The Queen encouraged them to construct more and better craft, and she reaped the benefit of her foresight when the Armada came. In the year following her accession, such had been her energy, she witnessed the launch, at Woolwich, of a ship bearing her own name, and at later periods she built the fortress Upnor Castle, on the banks of the Medway. In February, 1582, Elizabeth went to Rochester, in honour of the Duke of Anjou, who was about to return to France, and there she proudly showed him the great ships which she had in port, and took care that he went on board most of them, so that he could fully understand their might. The Duke was one of the sovereign's suitors, and might

have married her but for the outcry in the country against a "Popish king." This was perhaps a blow to Elizabeth's love affairs, but she had other things to bear in mind besides possible matrimonial alliances, and there were many handsome and romantic adventurers who made a strong appeal to her. Foremost in the band were men like Drake and Raleigh—Sir Francis who became the terror of the Spanish Main, and Sir Walter, who founded Virginia and put on record many interesting things relating to the Navy of his day. There was Richard Grenville, too, and John Hawkyms and Martin Frobisher numbered with the sea-dogs who saved England in her time of peril.

Rough and rude though the period was ashore, yet it was infinitely worse for men to be afloat, since ships were at sea for comparatively long periods and accommodation was bad and inadequate, while there were no means of keeping meat and drink fresh for any length of time. Only the hatred of Spain, the lust of fighting and the certainty of splendid gain and royal recognition in case of success, could have induced men to venture upon the distant waters in such ships as those of Elizabeth's reign. Primitive though the vessels and their accommodation were, yet Raleigh saw a tendency to too much luxury afloat, and he considered that the height of the ships was far too great. He had Spartan ideas of what should be the lot of those who went forth upon the waters.

"Men may not expect the ease of many cabins and safety at once in sea service," he declared. "Two decks and a half is sufficient to yield shelter and lodgings for men and mariners, and no more charging at all, but only one low cabin for the master. . . . Albeit, the mariners

do covet store of cabins, yet indeed they are but sluttish dens, that breed sickness, in peace serving to cover stealths, and in fight are dangerous to tear men with their splinters." What Raleigh said concerning the pestilence-breeding powers of warships and their manifold dangers in action was proved on innumerable later occasions.

The certainty of war with Spain was known throughout the country, and the achievements of Drake and his fellow sea-dogs electrified the people and roused them to that enthusiasm which, five years later, ended in the annihilation of the Armada. In 1578 there were only 135 vessels in the whole kingdom of more than 100 tons each, and less than 700 exceeding 40 tons; yet when the Armada came ten years later 163 ships were placed by their owners at the public service, and of these 83 were over 100 tons each.

When the Armada came Elizabeth had 34 ships, with a tonnage of 12,590 and a total of 6279 men—practically the same as in the time of Henry the Eighth, so that the Queen, in spite of the charges of parsimony which have been made against her, had at least raised the Navy to its former strength. New ships had been added, and some of these bore names which are maintained in the Royal Navy to-day, amongst them being the *Vanguard*, the *Revenge*, the *Victory*, the *Triumph*, the *Dreadnought*, and the *Swiftsure*. The largest of the ships carried 55 or 60 guns. The greatest ship was the *Triumph*, of 1100 tons, with a crew of 500, the next being the *White Bear*, of 1000 tons, with a complement of 490. All the best men of the day were serving in the big ships, for the pay of the officers was governed

by the size of their vessel. This system prevailed for a long period.

London River continued to be the home of the battleship and the headquarters of the Royal Navy long after Elizabeth died. In the last twenty-five years of her reign the Navy was almost doubled, and the cost of maintaining the fleet had grown until it amounted to about £30,000 a year. The Thames had given to the Navy the earliest and best of its fighting ships, and shortly after the death of the Queen, in 1603, there appeared those wonderful creations of Phineas Pett which filled the world with awe and envy. There were at that period vast quantities of large oak timber available for shipbuilding, and as the current price of the timber was only about 10s. a load, the cost of construction was greatly reduced.

Ships for the Royal Navy were built by contract, and victualling also was done by contract; the Government allowing eightpence a day for the diet of each man when in harbour and sevenpence-halfpenny when at sea. More attention was paid to the decoration of ships of war, especially the battleships, than was given either to their equipment or complement. This magnificence was a relic of the barbarous display of earlier ages.

The imperfect method of calculating the size of ships had given place to something like a definite system of measurement when the first two ships that were undertaken by the Commissioners of the Navy were built at "His Majesty's Timber-yard at Deptford," and were named by King James the *Constant Reformation* and the *Happy Entrance*. These vessels were built in the dry dock, the *Constant Reformation* being 106 feet long

on the keel, $35\frac{1}{2}$ feet broad amidships, with a tonnage of 750, and the *Happy Entrance* having a length of keel of 96 feet, a beam of $32\frac{1}{2}$ feet, and a tonnage of 580. These were fine vessels of their day, but not so notable as the ship which was variously named the *Prince* and the *Prince Royal*, the largest ship that had ever left an English dock. She was a vessel of 1400 tons, with a length of keel of 114 feet and a beam of 44 feet. She was considered to be an enormously strong ship, being "double built." The *Prince* was designed to carry 64 "pieces of great ordnance," but the armament was almost secondary to the decorations, for she was "most sumptuously adorned within and without, with all manner of curious carving, painting and rich gilding, being in all respects the greatest and goodliest ship that ever was built in England."

The King and the Prince of Wales, who had already visited Woolwich to see how this triumph of naval architecture progressed, went again, on 24th September 1610, accompanied by the Queen and a great number of noble dames and lords to see the ship launched. Owing to the narrowness of the dock the launch could not then take place; but at three o'clock next morning the ship was got afloat and duly christened. The King gave her to his son, the Prince of Wales, a youth who was deeply interested in the Navy. In 1611 the Prince went to Chatham, where he showed his attachment to the service by inspecting all the ships at that port and making notes of his observations of them.

The young Prince of Wales was trained to take that interest in the Navy which has been so markedly shown by King George v. and his eldest son, the present Prince. Pett in his memoirs relates that in January 1603-4 he

was ordered by the Lord High Admiral to build a vessel at Chatham with all speed "for the young Prince Henry to disport himself in above London Bridge; her garnishing to be like the work of the *Ark Royal*, battlement-wise. This little ship was—in length by the keel 28 feet, in breadth 12 feet. I laid her keel the 19th January, and launched her the 6th March.—Set sail with her 9th March, and on 14th anchored right against the Tower, before the King's lodgings, his Majesty then lying there, before his riding through London." On the 22nd the boy Prince and the Lord High Admiral, with a noble company, went on board the miniature battleship, which the Admiral christened with a great bowl of wine, and named her the *Disdain*. Pett was appointed captain of this little vessel, the object of which was to make the Prince acquainted with shipping. Something more and far greater than that was in prospect, for in June 1612 Pett began to prepare, at Chatham, the frame of a new ship, for a pinnacle to the *Prince*, "in which his Highness did propose to solace himself sometimes in the narrow seas, and therefore she was appointed to be fitted with a very roomy cabin, and all other accommodations for the purpose." This pinnacle, which was of 250 tons burden, was launched on 27th February 1613; but the Prince never used her. He died a few weeks before his little ship took the water.

The *Prince Royal* of the seventeenth century was in many respects the most noted ship of her day; the battleship *Hindustan*, in which the present Prince of Wales served as a midshipman, is also remarkable, for she is the first battleship to be built, armed and engined by a private firm, and to pass direct into commission from

a private yard. She was launched by Messrs. John Brown Limited, at Glasgow, on 19th December 1903—nearly three centuries after the *Prince*—and having been completed in thirty-two months, she formed a record up to that time in battleship construction.

The Prince of Wales, in serving as a midshipman in the *Hindustan*, followed the example of the Sailor King; but in circumstances that differed vastly from the conditions of the old Navy. When Prince William Henry, on 15th June 1779, entered as a midshipman on board the *Prince George*, of 96 guns, the British Navy was passing through a critical and humiliating period. Less than a year previously the English fleet under Keppel and the French fleet commanded by d'Orvilliers had met ingloriously off Ushant, with the result that Keppel was court-martialled, but honourably acquitted. France, Spain and America were three open and powerful enemies, and other nations were probable opponents.

Rotten ships, savage discipline, universal immorality and drunkenness—these were some of the characteristics of the wooden walls in which the future monarch served his sea apprenticeship. Insanitary conditions on board, undrinkable beer, bad beef, putrid pork, maggoty biscuit, and indescribable water—these were amongst the discomforts which had to be endured even by a youth who was destined to become a king. How different are the conditions that prevail to-day on board the *Hindustan*, with her wonderful appliances for furnishing the maximum of comfort while at sea.

The present Prince of Wales led the life of an ordinary midshipman, with certain reservations that inevitably apply to his position and prospects; but Prince William

Henry was in a different case, for when he entered the Navy there was but little prospect of his accession to the throne; and he made early acquaintance with prisoners of war, sickness, and death. And well, indeed, he might, with such an inflexible admiral to follow as Rodney. He was scarcely fourteen years old, yet he had experienced the horrors of war and the dangers of the sea. A Spanish admiral had said of him, "Well does Great Britain merit the empire of the sea, when the humblest stations in her Navy are filled by princes of the blood!" and Frederick of Prussia had declared that in England one of the King's sons, wishing to instruct himself, had not scrupled to set out as a common sailor.

The young prince shared in Rodney's relief of Gibraltar and Minorca in 1780, and on returning home became the idol of the people.

"The genuine offspring of the Brunswick name
Prov'd his high birth's hereditary claim;
And the applauding nation hail'd with joy
Their future hero in the intrepid boy."

He went to Drury Lane Theatre and the crowd was so great that a bridge had to be made from the stage to the pit, to allow the people, who were in danger of being crushed to death, to pass out.

Prince William was soon at sea again, under Admiral Geary, one of Hawke's valiant school, whose flag was flying in the *Victory*, the very ship, now at Portsmouth, in which Nelson died, thanking God that he had done his duty. She was the flagship of the Channel Fleet, consisting of twenty-nine sail-of-the-line—two more than were present at Trafalgar. The fleet was absent but a few

weeks, yet when it returned to St. Helen's, off the Isle of Wight, Geary was so ill that he had to relinquish the command and there were 3000 men on the sick list. Prince William, however, had such a splendid constitution that throughout the whole of the dangerous cruise he never had a day's illness. He had made the acquaintance, too, of a Biscay gale in which the *Prince George* escaped collision with the *Duke*, of 90 guns, the space between them being so narrow that a biscuit could have been thrown from one ship to the other. The *Prince George*, however, was soon at sea again, protecting the homeward-bound West India trade, and with a dozen sail-of-the-line she kept at sea till the beginning of December, when the squadron was forced to return, as there was only enough bread left to last two days.

There was a brief pause for royal festivities ashore, then Prince William was afloat again, scorning to take advantage of his rank. It is recorded of him that no one dared for a second time to address him as Your Royal Highness.

The Prince was accommodated, like his fellow-midshipmen, in the orlop, which was the lowest deck, over the hold, and the royal youth shared space with cables and store-rooms. He was the life and soul of a mess which was twin-brother to much squalor, poverty, and suffering. The future king had many rounds with the fists, and he acquitted himself on every occasion like a good commoner.

Again, the Prince shared in the siege of Gibraltar, and it is recorded as a remarkable fact that two princes of the blood, who afterwards became sovereigns, were present on that famous occasion, Prince William's com-

peer being Comte d'Artois, who became King of France. From Gibraltar the youth went to New York, where some enterprising Americans schemed, without success, to kidnap him. Later, he became intimately acquainted with Nelson.

One of the Prince's last acts, before leaving the Navy which he learned to love so well, was in connection with a midshipman named Benjamin Lee, who had been sentenced to death by court-martial for disrespect to a superior officer. Such a barbarous and monstrous sentence was in keeping with the spirit of the "good old times" of which the ignorant love to prate. Lord Hood was the president of the court, whose finding greatly troubled the midshipmen. Helpless in their extremity they knew not what to do. The midshipman was ordered for execution, and there was no time to appeal either to the Admiralty, or petition the Commander-in-Chief. Prince Henry at once came to the front and drew up a petition. He was the first to sign it, and the one to present it to the proper quarter, with the result that Lee was reprieved, to the intense relief and gratitude of his brother midshipmen and the whole fleet.

Phineas Pett, like his friend and contemporary Samuel Pepys, was a Cambridge University man, and in the ships he constructed for the British Navy he did what the amazing diarist achieved in connection with the early history of the fleet. Pett had shown to the world, by way of the *Prince*, what it was possible to do with the products of English forests. He had evolved a splendid fighting vessel with big tonnage, great armament, and royal splendour; but the famous ship

was completely belittled by the *Sovereign of the Seas*, which was built at Woolwich in 1637, before the devastating Civil War broke out. In the *Sovereign* magnificence ran riot. She was meant to be, first and foremost, a gorgeous ship, and she triumphantly succeeded in being not only that but also a model for designers and constructors of our own and other navies. Charles I. built more than a score of ships for the Navy, and, like his royal predecessors, he made many journeys to Deptford and Woolwich to see how they progressed, and to witness their launching. One day, in February, 1634, he was present at Woolwich at the launching of the *Unicorn*; the next day he saw the *James* take the water at Deptford.

The *Sovereign of the Seas* absorbed the interest and attention of the King, as well as her designer, from the time she was projected until the day of her launch. On 14th May 1635, Pett took leave of the King at Greenwich, and hastened into the north to provide and prepare the frame timber, plank and treenails for the *Sovereign*. He went to Newcastle by a ship which was specially hired to carry the workmen, etc., and attending the Bishop of Durham he found his lordship and all the nobility and gentry "wonderfully ready" to help him. Very soon there was enough of the frame ready to load a large collier, and the vessel reached Woolwich with timber shipped at Newcastle from Chapley Wood, and at Sunderland from Branspeth Park. On 21st December the keel was laid in dock, and on 16th January the King visited Woolwich to see part of the frame and the floor laid, paying another visit on the 28th. The *Sovereign* was launched in October, 1637, she being "just so many

tons in burden as there have been years since our Blessed Saviour's incarnation, namely, 1637, and not one under or over. A most happy omen which, though it was not the first projected or intended, is now by true computation found so to happen."

In a famous "small tract," published in 1660, E. Hayward gave many interesting details concerning the *Sovereign*. His work was designed for the benefit of the service, and he hoped, now that James was on the throne, that it might be permitted to "see the light with freedom, from which it hath been kept this five years since it was printed, all the Copies still remaining in the Author's hands, who hath not yet disposed of twenty of them to this blessed Day." A "near estimate" of one complete suit of sails for her was £404, compared with £350 for the *Resolution*, built in 1641. The canvas needed to make her a suit of sails and the quantity in each sail was given as follows:—

	Yards.
Spritsail course and bonnet . . .	308
Spritsail topsail . . .	192
Forecourse and bonnet . . .	1230
Foretopsail . . .	482
Foretopgallant sail . . .	130
Maincourse and bonnet . . .	1640
Maintopsail . . .	721
Maintopgallant sail . . .	180
Mizencourse and bonnet . . .	430
Mizen topsail . . .	200
	5513

This total may be compared with that of a ship-of-the-line of the day of her greatest development. A ship of 120 guns had an area of 24,510 square feet,

compared with 34,062 for a French ship of the same class. A 74-gun ship had an area of 22,325 square feet, a corresponding French ship having 26,103 square feet.

The designer ran riot in decorating the *Sovereign*, and perhaps it was his remarkable achievement in incorporating classical and allegorical figures and subjects which in after years induced a high official, who was also a superior person, to burden the British Navy with a number of names that were rarely pronounced correctly, which to the vast majority of officers and men meant nothing, and are to-day, when retained because of their historic association with the British fleet, a sore tribulation to some of those who venture on their utterance. In former years *Bellerophon* was never more than Billy Ruffun to the seamen.

Royal King Edgar was represented sitting on the beak, on horseback, "trampling upon seven kings"; strange contrast to that other conqueror, Cupid, who was upon the stern-head, not making love, but "bestriding and bridling a lyon"; statues representing counsel, care, industry, strength, virtue, and victory mingled with figures of Jupiter, Mars, Neptune, Æolus, trophies of artillery, and "several angels holding their letters in compartments," all the works being gilded over, and no colours but gold and black being used, so that the appearance of the ship, especially with the sun shining on her, must have been magnificent, especially in the estimation of the loyal people of her time, who followed their royal master in admiration of display.

One enormous oak tree made four of the principal

beams of the ship, the tree being 44 feet of strong and serviceable timber in length, 3 feet in diameter at the top, and 10 feet in diameter at the bottom. One piece of timber which made the keelson was so immense that twenty-eight oxen and four horses with much difficulty drew it from the place where it grew and whence it was cut, down to the waterside. The ship's length by the keel was 128 feet, but from the very end of the stern to the end of the stem it was 232 feet; her breadth was 48 feet, and she was 76 feet from the bottom of her keel to the top of her biggest lanthorn—that celebrated production which would hold ten persons standing upright, without shouldering or pressing upon each other. That this was not exaggerated was shown by the fact that Pepys, on his first visit to the *Sovereign*, entered the lanthorn with several other people.

The *Sovereign* had three flush decks and a fore-castle, a half-deck, a quarter-deck, and a round house. Her lower tier held thirty ports for demi-cannon and whole cannon; her middle tier had also thirty ports for demi-culverin and whole culverin; her third tier twenty-six ports for other ordnance. Twelve ports were on the fore-castle and fourteen on the half-deck. She had thirteen or fourteen more ports within board for murdering-pieces, besides a great many loopholes out of cabins for musket-shot. She carried ten pieces of chase ordnance in her right forward and ten right aft; and eleven anchors, one of them weighing 4400 lb.

The *Sovereign* carried ground tackle and other cordage weighing more than 60 tons, the weight of her rigging being 33 tons; that for the greatest second-rate ships being nearly 23 tons.

The *Sovereign's* boats were—

	Length.	Breadth.	Depth.
Longboat .	50 ft. 10 in.	12 ft. 6 in.	4 ft. 3 in.
Pinnace . .	36 „ 0 „	9 „ 6 „	3 „ 3 „
Skiff . .	27 „ 0 „	7 „ 0 „	3 „ 0 „

Her largest anchor weighed 3 tons, and her greatest cable had a circumference of 21 inches.

The *Sovereign* had a glorious career. Being taken down a deck she became one of the best men-of-war in the world, and so formidable did her enemies consider her that none would willingly lie alongside her. She took part in nearly all the great engagements between France and Holland, and in the last fight between the English and the French, “encountering the *Wonder of the World*, she so warmly plied the French admiral, that she forced him out of his three-decked wooden castle, and chasing the *Royal Sun* before her, forced her to fly for shelter among the rocks, where she became a prey to lesser vessels, that reduced her to ashes.” Finally, the *Sovereign*, leaky and defective with age, was laid up at Chatham, in order to be rebuilt; but she was set on fire through negligence on 27th January 1696, and was destroyed, suffering exactly the same fate as her equally illustrious predecessor, the *Henry Grace à Dieu*.

There had been one or two three-deckers before the *Sovereign*, and Raleigh describes the *Philip*, one of the Spanish ships engaged with Sir Richard Grenville off

the Azores in 1591, as having three tiers of ordnance on a side, and eleven pieces in every tier ; she had eight chase-guns as well as her stern-port weapons ; so that she was at least an 80-gun ship.

The *Sovereign* began the era of the actual modern ship-of-the-line, the type of vessel with which the fame of the British Navy was to be established, and there was little change, compared with her, in the appearance of ships-of-the-line for the next two hundred years. There was an abolition of extravagant ornamentation, and the bow and stern in course of time were greatly altered ; but until the coming of the ironclad British battleships were, in their principal characteristics, the same as Pett's splendid creation.

London River kept up a close association with this class of ship ; but Portsmouth and Plymouth were entering into competition with the tideway of the capital. A Royal dockyard was established at Plymouth in 1689, and in 1691 Parliament voted money for building one dry dock and two wet docks at Portsmouth. In 1650 Portsmouth had neither masthouse nor dry dock, and not more than a hundred shipwrights were employed there, while at Plymouth, before 1691, the master shipwright and artificers were borne on board one of His Majesty's ships which had been fitted for their reception.

From the time of the *Sovereign* onward, till the day when steam completely conquered sail, the Thames had first place in naval construction, just as it had the chief position in building the *Great Eastern* ; then the glory and importance of the Royal dockyards on London River departed. Woolwich became an arsenal ; Deptford is a Government victualling yard, and though Sheerness

and Chatham are still famous places in connection with the Navy, still their day as great shipbuilding centres has gone, though Chatham has in recent years contributed some of the finest battleships to the country.

Not far from the spot at which the new *Thunderer* was completed on the Thames, at Dagenham, there lies a mass of shapeless steel which was that battleship's predecessor, the turret-ship *Thunderer*, of nearly 10,000 tons, the largest vessel that was ever broken up on the banks of London River.



H M S. *VICTORY*, BOW VIEW.



H.M.S. *VICTORY*, BROADSIDE VIEW.

CHAPTER III

“DREADNOUGHTS” AND “VICTORYS”

THE *Victory*, resting in Portsmouth Harbour, though stripped of all her early grandeur and little better than a hulk, is yet a moving sight, especially at eventide, when her lights are burning and her defects, due to alterations and necessary patching, are mercifully hidden in the gloom. Her bow and stern have been altered beyond recognition; her masts and spars are of the “monkey” type, eyesore structures have been built upon her deck, and many of her ports have been changed or closed. She is a sentimental show, a meeting-place for courts-martial, a nominal headquarters for a Commander-in-Chief; a mere reminiscence of what she was in Nelson’s time and in the days of the admirals who preceded and followed him in the ship. The only resemblance she bears to her original self is in her general shape, particularly the tumble-home; but with all her faults and failings she remains the most impressive and fascinating ship afloat. She is incomparable in her power to move the imagination and to stir the memory; unapproachable in her subtle magnetism. When gazing at or visiting the *Victory* we forget that she is but a worn-out ship-of-the-line, a structure of decaying timber. We look upon her as a sentient being, and listen to her whispered tales of battle, suffering, endurance, death, and

triumph; for all these things she knew. The worst evils of the old Navy were rampant in her, the sternest punishments of the days of merciless and savage discipline were inflicted upon her seamen—the lash was plied incessantly during the Trafalgar commission—and her blood-sodden decks were burdened repeatedly by wounded men. Hosts of hard-living, hard-dying officers and men knew her as a floating home, and there were in her great numbers of men—and women, too—when the *Royal George* went slowly over, not far away, some of the survivors being rescued by the *Victory's* boats.

The *Victory* is not dead; she sleeps and dreams, wakefully, telling us of the wondrous things she has known and seen and done; keeping us in touch with the brave old days of sail and oak. And she is a link, a living link, with the long-past generation that gloried in and marvelled at the *Great Harry*, and the *Victory* in Elizabeth's fleet. From the time of the Armada till to-day there has been a *Victory* in the Royal Navy, and just as a regiment brings down from generation to generation its honours, life and spirit, so the *Victory* is a vital connection with the most illustrious of British battleships.

The *Dreadnought* of to-day is another continuous link with the Navy that Henry the Eighth founded, for the first of her name was one of Elizabeth's ships. Every type of ship-of-the-line and two of the most famous examples of modern battleships have been represented by *Dreadnoughts*, so that in the pioneer of the existing mammoths we have another link with the days of long-suffering, courage, and endurance at sea.

The *Dreadnought* of the Commonwealth came into

prominence in connection with a pamphlet published in 1669 by Sir Robert Slingsby, who was at that time Controller of the Navy. He outlined the civil history of the existing fleet, and this was followed by some observations by a writer named Gibson, who dealt with the military department of the Navy, and in doing so ruthlessly assailed the gentleman captain and all that belonged to him, and compared him unfavourably with the commanders of humble origin who had risen to fame. Ships were bad sailers, he declared, solely because gentlemen were in command of them; and he found that in Elizabeth's time “the Spanish as well as the English gentlemen thought themselves too wise to follow orders.” Many calamities, indeed, were due to the want of “tarpawling commanders,” or “gentlemen thoroughly acquainted with maritime affairs;” and he called upon readers to observe the difference between the Queen's gentlemen and those of his own day—“to be sure they (the Queen's) wanted no courage—damneing, drinking, etc., were not then practised.” The fact that the *Mary Rose* and the *Dreadnought* lost most of their men by sickness showed how little care gentlemen took of their ships' companies, to carry on their design of gain; and he declared that after the Dutch Wars the decay of the Navy was due entirely to these gentlemen captains, who for the most part met with more accidents, too many of their own making, than a seaman captain, and quoted a case in which the nation had lost £500,000 by making a gentleman captain of a fifth-rate ship. A gentleman was put in command of, say, a fourth-rate ship, with a complement of 200 men, and took nearly twenty landsmen into the ship, as his footmen, tailor, barber, fiddlers,

“decayed kindred, voluntier gentlemen, or acquaintance, as companions, etc.” These had the accommodation of a master’s mate, midshipmen, quartermaster, master trumpeter, coxswain, etc., and too often took their pay. Gentlemen captains’ retinues, indeed, were of Bishop Williams’s opinion, that Providence made man to live ashore and that he is driven to sea by necessity, whereas a seaman went to sea as a trade and by following it expected to raise his fortunes. The retinues valued none but of their own stamp for immorality, swearing, drinking, and gambling. The gentleman captain, “as the buck rabbit eats his young,” destroyed his breed of seamen by casualties of his own making; he spoke “bigg,” cried, let all stand till all comes by the board, then declared that masts and yards were rotten or too small. He claimed the steerage for his grandeur, the quarter-deck for his jars, pigeons, etc., and often all abaft the main-mast on the upper deck. The seaman, however, was familiar amongst his men, talking with the watch, and being on deck all night in foul weather and giving the most active “a dram of the bottle.” A gentleman had a sentinel at his great cabin door, to keep silence in the belfry, and often beat the master for not instantly answering the captain’s bell in the night, although it was not his watch, to answer impertinent questions, the result being that there were few good masters left in the Navy. Before gentlemen came to command in the Navy, and direct maritime affairs ashore, continued Gibson, England was able to fight with all the world at sea; but since 1660, owing to gentlemen’s management, the country was forced to make up its fleet with a third-part French to fight the Dutch, or a

third-part Dutch to fight the French. Gibson refers to the journal of the captain of a fourth-rate ship from which he found that during one voyage he was 460 days in port and only 164 days at sea. These captains had brought into the Navy drinking, gambling, immorality, swearing and all impiety, and had banished all order and sobriety from their ships; while they had had the further ill effect of bringing seamen “to covett to act like gentlemen, when gentlemen should learn to act like seamen.”

In all such tribulations as these the *Dreadnought* of Gibson's generation played her part, as she and her namesakes did in every way at sea. Elizabeth's *Dreadnought* was built in 1573, rebuilt in 1592, and again in 1613, when she was forty years old. She was of 400 tons, and carried 130 mariners, 20 gunners, and 50 soldiers, a total of 200. She was armed with 41 guns, of which 29 ranked as heavier, and 12 as lighter ordnance. The former were 2 cannon, 4 culverin, 11 demi-culverin, 10 saker, and 2 falcon; the latter were 4 fowlers, and 8 fowler chambers. In 1587, when Drake singed the King of Spain's beard, the *Dreadnought*, which then carried 190 men and 32 guns, was one of the ships of the squadron. She was commanded by Captain Thomas Fenner, a first-rate officer, who was killed in the attempt on Lisbon in 1589. The *Dreadnought* was one of four royal ships with which Sir Martin Frobisher joined in the final assault on Crozon in 1594, when he was mortally wounded. The captain of the *Dreadnought* at that time was Alexander Clifford. In 1596 the *Dreadnought*, still under Clifford's command, took part in the Cadiz Expedition, Clifford being knighted for the service.

The *Dreadnought* carried 200 men and 41 guns, her Armada equipment. In the same year the *Dreadnought* was one of the ships with which Cumberland sailed against Spain. One of the ships, the *Scourge of Malice*, was disabled by a storm in which thirty-six sail were lost, and the expedition was forced to return. Again, in 1597, the *Dreadnought*, under Captain Sir William Brooke, went against England's inveterate enemy; in 1602 she was one of a squadron which was fitted out for the purpose of preventing Spain from interfering with Irish affairs, Captain Mainwaring being in command of her. In June the squadron under Leveson fell upon some Portuguese galleys and a great carrack of 1600 tons at Cazimbra. Leveson's own ship, the *Warspite*, was unable to get in for the start, whereupon he shifted his flag to the *Dreadnought*. The galleys were vanquished, many of the slaves escaping by swimming ashore, and the carrack sent representatives on board the *Dreadnought* to treat. She surrendered and proved to be the *Sao Valentino*, just home from the Indies, richly laden and worth a million ducats. Again, on 31st August 1602, the *Dreadnought*, under Captain Cawfield, was sent against Spain, being one of the ships of Monson's Expedition, the last naval undertaking of Elizabeth's reign. It was not a momentous affair, and the *Dreadnought*, whose crew suffered much from sickness, returned home independently, reaching England before the admiral.

The first *Dreadnought's* greatest honour, however, was the battle of the Armada. She was in the thickest of the fight, commanded by Sir George Beeston, who "behaved himself valiantly."

The *Dreadnought* was rebuilt in 1611-14 and survived until about 1645, when she was broken up. She was then a third-rate ship of 450 tons, with a length of keel of 84 feet, a breadth of 31 feet, a depth of 13 feet, and carrying 32 guns. The *Dreadnought* figured in a bold conspiracy of which the central figure was a renegade Englishman going under the name of Walsyngham. He commanded some Barbary corsairs; but returned to England, where he was condemned to the Tower for conspiring to seize the *Dreadnought* and return to his evil ways of piracy. The *Dreadnought* took part in 1625 in what is known as the Pennington Affair.

In 1660 a vessel called the *Torrington* was renamed *Dreadnought*. She was a ship of 738 tons and 52 guns; with a length of keel of 116 feet 8 inches, a beam of 34 feet 6 inches, depth in hold of 14 feet 2 inches, and a draught of 17 feet. Ten years later she was one of the first ships to be sheathed with lead, for the purpose of increasing speed and preserving the bottom. In 1690, when her captain was Robert Willmot, she foundered off the North Foreland. Her successor was the *Dreadnought*, of 64 guns, which in 1692 was one of the ships of the Blue or Rear Squadron at Barfleur, her captain being Thomas Coall. In August 1704 the *Dreadnought*, then commanded by Captain John Evans and carrying 60 guns, assisted, while returning from Virginia, in the capture of a French fifty-four.

In 1718 the *Dreadnought*, under the command of Captain William Haddock, was at the battle off Cape Passaro, Italy, on 11th August; in Syracuse, 1757, the *Dreadnought*, again a ship of 60 guns, fought against the

French on 21st October, just forty-eight years before Trafalgar. Her commander was Captain Maurice Suckling, Nelson's uncle, and she lost thirty-nine in killed and wounded. Before going into action at Trafalgar Nelson spoke of the day being the anniversary of his uncle's gallant conduct, and looked upon the anniversary as a favourable omen.

The *Dreadnought* in 1745 (Captain Thorpe Fowkes) and three other ships-of-the-line (the *Captain*, the *Hampton Court*, and the *Sunderland*) were cruising off Ushant when three French ships were sighted—the *Neptune*, 74, the *Fleuron*, 64, and the *Mars*, a privateer. The *Mars*, commanded by George Walker, had been captured two days before. The two French ships were homeward bound from the West Indies, and were supposed to be carrying specie to the value of four millions sterling. The French ships were foul after their long passage from Martinique, and the crews were very sickly. Boldly attacked, there is no doubt that they could have been taken; as it was, the *Dreadnought* sailed very badly and the *Captain* having seized the *Mars*, and the *Sunderland* having dropped astern because her main-topmast had been carried away, the chase of the two French ships was left to the *Hampton Court* and the *Dreadnought*. Captain Savage Mostyn, who commanded the *Hampton Court*, formed the opinion that nothing could be done, and the Frenchmen and their reputed four millions got into Brest. Mostyn was court-martialled, but acquitted; yet a year afterwards, when he took the *Hampton Court* out of Portsmouth, he was greeted with shouts of "All's well! There's no Frenchman in the way!" Which shows what the people thought, whatever the opinion of the court-martial might be.

The next *Dreadnought* was built at Portsmouth in 1801. She was designed by Henslow and was a 98-gun ship of 2111 tons. Her dimensions were :—

	Feet.	Inches.
Length of gun-deck	185	0
Length of keel	152	6 $\frac{5}{8}$
Beam	51	0
Depth of hold	21	6

Her crew numbered 750.

Flying his flag in the *Dreadnought*, Admiral the Hon. William Cornwallis sailed on 17th May 1803, to cruise off Ushant and watch Brest; two years later she was flying the flag of Vice-Admiral Cuthbert Collingwood, who was earnestly searching for the French, and it was in the *Dreadnought* that he held on ceaselessly, in the hope of meeting the enemy, who was eventually brought to action in Trafalgar Bay. The *Dreadnought's* captain at that time was Edward Rotheram. Another captain of this *Dreadnought* was named Conn. He was a thorough seaman, and was greatly beloved by all who knew him. He was afterwards in command of the *Swiftsure*, 74, and his career ended tragically in May 1810, when, in a fit of madness, he jumped overboard out of his stern cabin and was drowned.

When Trafalgar was fought, Collingwood had shifted his flag to the *Royal Sovereign*, and the *Dreadnought* was commanded by Conn. She was one of the ships of the lee column under Collingwood, and in the action she lost seven killed and twenty-six wounded, the latter including a lieutenant and two midshipmen. The *Dreadnought* engaged the *San Juan Nepomuceno*, and after fifteen minutes' fighting captured her. She did not, however,

take possession of the ship ; but immediately assailed the *Principe de Asturias*, another Spanish vessel, which, however, escaped.

Nearly five years after Trafalgar, on 9th September 1810, the *Dreadnought* had an unlucky experience. She was cruising off Ushant, carrying the flag of Rear-Admiral Thomas Sotheby, her captain being Valentine Collard, when it was reported that a ship was on the rocks. Early in the morning, seven boats, under Lieutenant Pettman, were sent to bring the vessel off. They were met with a destructive fire from troops and two field-pieces on the beach ; but they boarded and took the stranded vessel, which was a Spanish merchantman, prize to a French privateer. Almost at the same moment when the boarding was so pluckily effected, a heavy fire was opened by about 600 soldiers who were on the heights. No reply could be made from the boats, and the lieutenant had to withdraw his men, with a loss of two boats, six killed, thirty-one wounded, and six missing.

Another famous *Dreadnought* was to appear ; but named at first the *Caledonia*. She was launched in 1808 at Devonport, from the designs of Sir W. Rule, and was a first-rate of 120 guns. This ship was ordered to be laid down so long previously as 1794 ; but the building of her was not begun until 1805. When launched she had a square stern ; but this was afterwards rounded. The *Caledonia* was the largest ship that had been built in England, though she was somewhat smaller than the famous *Commerce de Marseilles*, which had been taken from the French. The *Caledonia* had a length on the gun-deck of 205 feet, she was 53 feet 8 inches broad, 23

feet 2 inches deep in the hold, and was of 2616 tons burden. She was considered to be the finest ship of her class and was Lord Exmouth's favourite vessel. In 1856, re-named the *Dreadnought*, she became the hospital ship at Greenwich.

The famous *Dreadnought* of the 'seventies was also under construction for a long period, operations on her being suspended for several years, partly owing to the loss of the *Captain* and partly to the doubts as to the success of mastless ships. But when the *Dreadnought* was finished she created almost as great a sensation as her present-day successor. She was built at Pembroke, and was a ship of 10,800 tons and 8000 horse-power, giving her a speed of over 14 knots. Her original name was the *Fury*. The *Dreadnought* proved an excellent vessel and had many admirers during her active life of more than thirty years.

In 1906 the present *Dreadnought* revolutionised the world's navies by superseding the universal practice of a mixed armament of heavy and light guns and substituting a greater number of the most powerful weapons. To carry out this principle a ship was needed of far greater dimensions and speed than anything previously known. These requisites were furnished by the *Dreadnought*, whose length is 490 feet, breadth 82 feet, draught $26\frac{1}{2}$ feet, and displacement 17,900 tons. Her cost was £1,813,100, an average of £101 2s. per ton. The *Dreadnought* is the first battleship to be propelled by turbine engines, and the first to provide accommodation for the officers in the fore part of the ship. Her cost was greatly in excess of that for the whole of her predecessors.

The story of the *Victory* is far different from that

of the *Dreadnought*, for she represents only the sailing ship-of-the-line. She has nothing to do with armour, turrets, barbettes, turbines, wireless telegraphy, double bottoms, bilge-keels, innumerable auxiliary engines and watertight compartments, torpedoes, torpedo-nets, gigantic guns, fire-control stations, range-finders, and the rest of the bewildering equipments and appliances of modern mammoths. The very name of *Victory* brings up mental pictures of simple days of sail and oak and small muzzle-loaders ; of stubborn conflict and hard-won triumph—and also stands for visions of a terrible disaster at sea and the passing of the greatest of Great Britain's sailors. The British people alone, of all the nations of the world, possess such opposites as the *Dreadnought* and the *Victory*.

The first *Victory* was bought in 1560, being then a vessel named the *Great Christopher*. She was rebuilt in 1586, and was of 800 tons. Her complement numbered 400, of whom 268 were mariners, 32 gunners, and 100 soldiers. She carried in all 59 guns. This *Victory* was commanded in the Armada fight by Sir John Hawkyns, when she had a total of 430 men and 42 guns. She was rebuilt in 1610. Her successor was a second-rate of 875 tons, built in 1620. She had a length of keel of 108 feet, a beam of 35 feet 9 inches, and a depth of 17 feet. She carried 42 guns. She shared in Blake's fights with Tromp, when she bore the flag of Lionel Lane, vice-admiral of the Blue. Following this vessel was the *Victory*, of 1029 tons, rebuilt in 1665 and condemned in 1690. She had a length of 121 feet, a beam of 40 feet, a depth of 17 feet, and a draught of 19. She was an 82-gun ship and had a complement of 530.

In the bloody four days' fight with the Dutch in 1666, Vice-Admiral Sir Christopher Myngs was flying his flag in the *Victory*. He was shot through the throat by a bullet, but for half an hour he remained on deck, stopping the flow of blood with his fingers; then he was killed by a second shot which struck him in the neck. In that memorable affair no fewer than nine captains were killed—John Chappell, Henry Terne, John Coppin, Roger Miller, Walter Wood, Peter Mootham, Thomas Whitty, Philemon Bacon, and Jefferey Dare.

In 1692, when the battle of Barfleur was fought, there was another *Victory*, a ship of 100 guns, bearing the flag of Admiral Sir John Ashby, commanding the Blue or Rear Squadron.

In 1744 the *Victory*, which was reckoned the finest ship in the world, was lost on the deadly Casquets, in the Channel Islands, on the night of 4th October. More than a thousand officers and men perished with her, amongst them being Admiral Sir John Balchen, Captain Samuel Faulknor, and fifty young gentlemen volunteers. This ship was a first-rate of 100 guns, and was launched at Portsmouth in 1737. She was 174·75 feet long, 50·5 feet broad, 20·5 feet deep, and of 1921 tons.

In 1765 there was launched another *Victory*, which was to be and is the most famous battleship the world has ever known. She was built at Chatham by E. Allen, after designs by Sir T. Slade. Her dimensions were:—

					Ft.	in.
Gun-deck	.	.	.	.	186	0
Keel	.	.	.	.	151	3 $\frac{5}{8}$
Beam	.	.	.	.	52	0
Depth	.	.	.	.	21	6
Tons	.	2162		Guns	.	100

No battleship that was ever built has been more fully written about than the *Victory*, none has had a more remarkable record both in war and peace; none has been seen and visited by more people. There is a little history in existence relating solely to the *Victory*, one of the unassuming locally-printed productions which in course of time become so greatly treasured by the collector. This work, which is now out of print, consists of less than sixty pages. It was written by Lieutenant now Admiral W. J. L. Wharton, R.N., when he was Hydrographer to the Admiralty, and the rights in it were presented by him to the Seamen and Marines' Orphan School and Female Orphan Home at Portsmouth, and the book was sold for the benefit of that institution. As a labour of love and a seaman the writer set forth to give a short account of the *Victory*, with particulars of the battle of Trafalgar and the death of Nelson. The work was published in 1888, at which time the *Monarch* offered the inevitable contemporary comparison with the broadside weight of the *Victory's* fire. In 1803 the weight of the *Victory's* broadside from 52 guns was 1160 lb. The broadside weight of the *Monarch*, with 6 guns, was 2515 lb., more than double that of the *Victory*. To-day a single gun, a 13.5, of a Dreadnought, will fire a shot weighing 1200 lb.—more than the whole broadside of the *Victory*—and the weight is apparently to be increased to 1400 lb.

Only once in her long career did the *Victory* show her stern to an enemy. That was in 1779, when Sir Charles Hardy was flying his flag in her. In March he was in command of thirty-seven ships-of-the-line; but the force was by no means so great as it might seem to have

been, for, in keeping with the practice of the times, many of the vessels were ill-manned and badly found. For some months Hardy cruised in the Channel and the neighbourhood, then, in August, he learned that the French and Spanish fleets had joined together and were off Plymouth. The admiral's information was that the combined forces consisted of no fewer than sixty-seven sail-of-the-line, with more than thirty frigates and smaller ships; nevertheless he looked for the enemy, and found that his information was correct. Prompted by the reflection that if he was defeated the enemy would imperil the safety of the country, Hardy withdrew and sailed for Spithead, the *Victory* for the first time in her long, brilliant and astonishing career sailing away from, and not towards, a foe.

There was something in the shape of gasconading by the combined fleets, the demonstration including a threatening appearance off Plymouth, to the consternation of the inhabitants; but beyond this threat of invasion nothing happened and the allies sailed away from the Channel without doing any mischief.

From start to finish of her career the *Victory* earned the character of being the best sailing three-decker ever launched; and for this reason she was always chosen as a flagship by officers who had the chance of securing her. There was not an admiral of note during the *Victory's* active career who did not serve in her afloat.

The writer of the little pamphlet gives an abstract of the history of the ship, showing the names of the admirals and captains who served in her, and these may well be mentioned here, as illustrating the renown of the chiefs and the nature of the ship's services. The admirals

were :—Hon. Aug. Keppel, Sir Charles Hardy, Kt., Francis Geary, Francis W. Drake, Hyde Parker, John Elliot (commodore), Richard Kempenfelt, Richard Viscount Howe, Richard Earl Howe, Samuel Baron Hood, Sir Hyde Parker, Kt., Samuel Baron Hood, Robert Man, Robert Linzee, Sir John Jervis, K.B., Horatio Viscount Nelson, Sir James Saumarez, Bart., K.B., Sir Joseph Sydney Yorke, Sir James Saumarez. It will be seen that two or three of the admirals served in the *Victory* during more than one commission, and the same thing happened in the case of several of the captains.

The *Victory's* own services, from the time she was launched at Chatham in 1765, are an epitome of Great Britain's contemporary troubles with her enemies. During the peace which prevailed at the beginning of her career she was laid up in ordinary, then, when war with France broke out, she was commissioned, Keppel being her first admiral and Sir J. Lindsey, K.B., her first captain. That was on 15th March 1778. The *Victory* was the flagship of the Channel Fleet. Her baptism of fire was received from the French, in the indecisive action for which Keppel was court-martialled, but honourably acquitted, the charges against him being declared to be "malicious and ill-founded." Keppel was the idol of the people, and when the news of the acquittal became known a signal-gun was fired at Portsmouth and the warships at Spithead cheered and saluted. Simultaneously a fleet of Indiamen at the Mother Bank demonstrated their delight by firing nineteen volleys, and the bells of Portsmouth Church rang throughout the day. The late Commander-in-Chief was escorted from the place of trial by an enormous and enthusiastic crowd. At night



CONVICTS GOING ON BOARD A PRISON-SHIP IN PORTSMOUTH HARBOUR.

E. W. Cooke, 1828.

Portsmouth and the neighbourhood were illuminated, and generally the demonstrations of joy were in keeping with the full-bodied spirit of the time. Keppel was asked to retain the command of the fleet, but he refused and was succeeded by Geary.

For a considerable period the *Victory* continued to serve as flagship. When she was flying the flag of Viscount Howe, who was Commander-in-Chief of the Channel Fleet, she sailed with thirty-four sail-of-the-line to escort a convoy to Gibraltar. That was in September, 1782; the relief of the fortress was effected in October, and later the *Victory* fought an indecisive action with the Franco-Spanish fleet of 45 sail. In the following year she was paid off, and she was employed off and on until the outbreak of the long and devastating war with the Republic of France. At this period began her most active and famous and varied services. Occasionally she was a private ship, that is to say, she did not fly an admiral's flag. She was a private ship in 1795 and again two years later, when she was in Jervis's fleet blockading Cadiz, and her boats were employed in night attacks under Nelson. At that time Nelson was entering upon the period of his greatest renown, and the day was not far distant when he was to die in the cockpit of the ship which had already established an unrivalled reputation.

From her high estate as a flagship the *Victory* fell to the low level of a prison-ship. She was paid off at Chatham on 26th November 1797, after which, till 1799, she was a prison-ship at Chatham. Then she was docked and nearly rebuilt in 1800 and 1801, being again commissioned at Chatham when war broke out. On 18th May 1803, Nelson hoisted his blue flag at the fore,

and with brief intervals it remained flying till Trafalgar Day.

Nelson's flag was finally rehoisted on 14th September 1805; on 21st October Nelson died, and from the 22nd October till 22nd December it was flying at half-mast, then it was struck. The last entry in the log of the *Victory* which is preserved in the Public Record Office, is for Wednesday, 15th January 1806, and is as follows:—"Fresh breezes and cloudy. A.M. Sent the remainder of the ship's company on board the *Amy* and *Countess of Cardigan*, tenders, to join the *Ocean*, and disembarked the marines to headquarters at Chatham—and hauled the Pendant down. T. M. Hardy, Captain."

The *Victory* was paid off on 16th January 1806 at Chatham, and she was docked and thoroughly repaired before being recommissioned in 1808. In that year Saumarez hoisted his flag in her as Commander-in-Chief of the Baltic Fleet. During those operations the ship herself was not engaged; but her boats were employed. The *Victory* blockaded the Russian Fleet in Port Baltic. She left the Baltic on 25th October and afterwards her flag was struck at Chatham. In the following year the *Victory* was a private ship in the squadron, under Sir Samuel Hood, which brought home the remnants of Sir John Moore's army from Corunna. She reached Portsmouth on 23rd January 1809, and again went to Chatham, where she was refitted. For the second time she bore the flag of the Commander-in-Chief of the Baltic Fleet, and was employed in the blockade of Cronstadt. Having served so gloriously at sea in connection with the smashing of the combined fleets of France and Spain,

the *Victory* was the flagship of a squadron of seven ships-of-the-line under Saumarez which went to Lisbon with troops for Wellington. That was in 1811. In the following year the brave old ship—she was getting on for her fiftieth year—for the third time flew the flag of the Commander-in-Chief of the Baltic Fleet, and again her boats were employed in action with gunboats. The flag was shifted to the *Pyramus*, and the *Victory* returned home and on 30th November 1812 paid off at Portsmouth.

Never again was the *Victory* commissioned for active service. In the year of Waterloo it was intended that she should be sent to sea, and despite the fact that there were in the Navy many finer, newer and more heavily gunned ships, yet so great was the renown of Nelson's flagship, so undisputed was her claim to be mistress of all ships that floated, that no fewer than half a dozen admirals, on applying for commands, indicated that the ship they wished to have was the *Victory*. She had thoroughly established her reputation as a fighter and a sailer, and not only that, but had given proof repeatedly of her seaworthiness. A terrible strain in this respect had been put upon her at the end of 1811, when, in company with other ships, she left the Baltic for England. Two days before Christmas there arose that disastrous storm which resulted in the loss of the battleships *St. George* and *Defence* on the coast of Jutland, and the wreck of the *Hero* off the Texel. This storm, which developed the force of a hurricane, and was accompanied by weather of the bitterest description, was safely weathered by the *Victory*, which, after crossing the North Sea, anchored at St. Helens on Christmas Day, and Saumarez, far

more fortunate than his comrades who were perishing off Jutland and the Texel, struck his flag on the most famous anniversary in the year.

For an almost unexampled period the *Victory* had been actively employed; for a century she has rested on her laurels. "In 1825," says Admiral Wharton, "she was made flagship in Portsmouth Harbour, and ever since that date, with but few intervals, she has continued to bear the flags of Admirals, who, having like her spent their lives in the service of their country, terminate their active careers by holding the highest post in the British Navy—the command at Portsmouth. . . . The *Victory* now no longer bears the Admiral's flag; the increasing numbers of seamen in our depots, rendered in 1869 a larger ship more convenient, and she is retained in her position in the harbour solely as a reminiscence of the past."

At my elbow as I write are some pieces of the *Victory*. They were taken from "the original portion of the bulwarks of H.M.S. *Victory* . . . when being repaired in Portsmouth Dockyard, September 1888." The relics belonged to Major-General Sir Owen Burne, late 20th Regiment, who duly inscribed the particulars. A century and a half of time has made the wood very dry and brittle; doubtless it could be readily crumbled. The life and sap have gone out of it, and there cannot be much vitality left in the original timbers which still remain in the noble old craft which rests in Portsmouth Harbour; but she holds together in the most amazing manner, and because of the incessant care that is bestowed upon her she is likely to remain afloat for many years to come.

In November, 1911, a relic of uncommon national interest was catalogued for sale by Messrs. Sotheby, Wilkinson, & Hodge. This was the original log, commonly called the deck-log, of the *Victory*, dating from 19th September 1805 to 15th January 1806. This work, of the authenticity of which there was no doubt, is the original of the log-book of the *Victory* which is preserved in the Public Record Office. The deck-log is the original record kept on board ship, and in it the events were recorded by the Master as they occurred, and it was his duty to make, subsequently, a fair copy for preservation at the Admiralty. As a rule, when this fair copy had been made the original deck-log was destroyed; but most fortunately for posterity this course was not adopted in the case of the *Victory*, and accordingly both the rough original and the fair copy are in existence. This particular deck-log was kept by the Master of the *Victory*, Thomas Atkinson, who entered the Navy in about 1790, and six years later became Master of Nelson's ship the *Theseus*. When Nelson lost his right arm Atkinson supported him during the amputation of the wounded limb, and he served with the great admiral continuously until his death at Trafalgar. Nelson had a high opinion of Atkinson, to whom he gave a warm testimonial, recommending him as “one of the best Masters I have seen in the Royal Navy.” The Master died in 1836, and at his death the precious log, which had been carefully preserved, passed into the possession of his second daughter, who married a naval officer. From the daughter the deck-log descended to her son, who in turn gave it to his son, the owner on whose behalf the log was

offered for sale. It was pointed out by a writer in *The Times* that "this deck-log is an extraordinary instance of the unreliability of 'fair copies.' A comparison of the original with the 'fair copy' in the Record Office reveals the remarkable fact that the deck-log alone records the signals which passed between the *Victory* and the fleet on the morning of the battle of Trafalgar, and that there is no mention of them whatever in the fair copy. Unfortunately this record stops at 9.15 a.m., and therefore does not include the famous signals made just before the action began." The fact that the deck-log was to be offered for sale excited great public interest, and there was naturally a strong feeling that such a valuable and unique record should not be allowed to leave the country or get into the possession of private collectors; but that it should be acquired for some British public institution. As a matter of fact the deck-log was not offered for sale by public auction, but was disposed of by private treaty.

This deck-log contains a short and vivid account of the death of Nelson, and the leaf from the book which bears on this event is reproduced in facsimile. It runs:—(At 3.40 made the signal for our ships to keep) "Their wind and engage the enemy's van coming along our weather line. At 4.15 the Spanish Rear-Admiral to windward struck to some of our ships which had tacked after them. Observed one of the enemy's ships blow up and 14 sail of the enemy ships standing towards Cadiz—and 3 sail of the enemy's ships standing to the southward—Partial firing continued until 4.30 p.m. when a victory having been reported to the Right Honourable Lord Viscount Nelson, K.B., & Com-

Their Wind and Engage the Enemy and coming a long
 on Weather Line at 4.15 The Spanish Rear Admiral
 to Windward stood to some of our ships which had Tacked
 after them - Observed one of the Enemy's Ships blow up
 and 14 Sails of the Enemy Ships standing towards
 us - And 3 Sails of the Enemy Ships standing to
 the Southward - Partial firing continued until
 4.30 when a Victory having been reported. To the
 Right Honourable Lord Viscount Nelson K. B.
 Commander in Chief - he then Died of his Wounds,
 at 5 The Mizen Mast fell about 10 feet above the
 Deck, The Lower Masts, Yards, & Boomsprit all
 crippled, Rigging and Sails very much lost - The ships
 around us much crippled - Some of our ships pursuing
 the Enemy to leeward. - Saw Vice Admiral Collingwood's
 Flag flying on Board H. M. Ship Lancelot - and some
 of our ships taking possession of the Prize - Struck the
 Gallies Masts - Got up Runners & Tackles to secure
 the Lower Masts - Employed clearing the Wrecks of the
 Yards & Rigging - When the Lancelot in 32 fms
 Sandy Bottom - Stood to the Southward and north - the
 Remnants of the Hon. Genl. & Main top Sails Sound
 from 19 to 13 fms At midnight moderate breeze
 & cloudy at 2.30 won this - At Day Light
 - saw our Fleet & Prize 43 Sails in sight. Still

By permission of The Daily Telegraph.

THE DEATH OF NELSON RECORDED IN THE DECK-LOG OF H.M.S. VICTORY.

mander-in-Chief—he then died of his wounds. At 5 the mizen mast fell about 10 feet above the poop, the lower masts, yards and bowspritt all crippled, rigging and sails very much cutt—The ships arround us much crippled—Several of our ships pursuing the enemy to leeward.—Saw Vice Admiral Collingwoods flag flying on board H.M. Ship *Euryalus*—and some of our ships taking possession of the prizes—Struck top gallant masts—Got up runners and tackle to secure the lower masts—Employed clearing the wrecks of the yards & rigging—Wore ship and sounded in 32 fms sandy bottom—Stood to the southward under the remnants of the fore-sail and main top sail. Sounded from 19 to 13 fms. At midnight moderate breezes & cloudy. At 2.30 wore ship—At daylight saw our fleet and prizes 43 sail in sight, still” (closing with our fleet). There are several discrepancies between the deck-log and the fair copy, an important one being the time named for the continuation of the partial firing. In the deck-log this is given as 4.30; but the time named in the fair copy is 3.40.

For more than a century the *Victory* had as a companion, though not in Portsmouth Harbour, a Trafalgar battleship. This was the *Duguay Trouin*, built by the French in 1798. She was a 74-gun ship, and escaped from the battle in which Nelson perished; but was soon afterwards captured by Sir Richard Strachan and added to the British Navy as the *Implacable*. For a very long period she served as part of the *Lion* training establishment at Devonport; then, described as “the old hulk *Lion*,” she was offered for sale at Portsmouth Dockyard as “Lot 19.” The

particulars given were:—"3842 tons displacement, 190 feet long, 57 feet beam, timber built, metal fastened and copper sheathed, and 90 tons pig-iron ballast." With her were the sailing brigs *Nautilus* and *Liberty*, so that there vanished simultaneously from the British Navy the last of the sailing ships and a famous relic, all of which, surely, might have been preserved as links with the most glorious periods of our naval history.

Another contemporary of the *Victory* was Nelson's favourite ship the *Foudroyant*. She was a two-decker of 80 guns, and was launched at Plymouth in 1798. Her active career ended in 1812. Eighty years later she was sold out of the service to a German ship-breaker; but there was an outburst of more or less patriotic indignation, and the *Foudroyant* was repurchased for £6000 and brought back to England and refitted. She was taken round the coast as a show ship and was wrecked in a gale on the exposed coast at Blackpool on 16th June 1897, the crew being rescued by the lifeboat. It is strange to think that a battleship which fought at Trafalgar, and rode out in safety so much tempestuous weather, should be lost in a summer gale; stranger still that there should go to her assistance such an essentially modern invention as the lifeboat. The salvaged timbers and copper were converted into various mementoes and articles of furniture. Doubtless some of the material which was so employed was wood that had been used in repairing and strengthening the battleship from time to time; but there was a good deal of the original oak left, some of which was annexed by relic-hunters. This timber differs little

in appearance from that which formed the original structure of the *Victory*, though that vessel had been much longer afloat than the *Foudroyant*. In each case, time and sea and weather had deprived the timber of all its nature.

CHAPTER IV

THE SHIP-OF-THE-LINE IN HER GLORY

THE most continuously glorious period in the history of the ship-of-the-line was that between 1702 and 1805. It was a time of almost ceaseless war with powerful enemies, especially the French, beginning with the triumphs of Benbow and ending with the death of Nelson—the one so ill supported that his gallant rival wrote and said, “As for those cowardly captains who deserted you, hang them up, for by God they deserve it”; the other dying surrounded by members of that band of brothers who had shared with him the crowning triumph of Trafalgar. Intermediately there came into notice, to establish lasting fame, Anson, Hawke, Boscawen, Howe, Rodney, Hood, St. Vincent, and Duncan—mentioning only chiefs. A man might be, and often was, a prisoner in his ship for incredibly long periods; but he never faltered in his duty, and seldom murmured or complained until he felt that it was in his country’s interests that he should be recalled or retire.

Ships and men alike were worn out by fighting, chasing and blockading, and all the great admirals told the same story of utter weariness of confinement on board; lesser officers being just as closely made captives. For almost exactly two years Nelson never set foot

out of the *Victory*; Collingwood, after Trafalgar, was shattered in health by being held to his duty so long without relief; and after his conquest in Quiberon Bay Hawke broke down so completely that he begged to be relieved. "I have now been thirty-one weeks on board," he said, "without setting my foot on shore." But the country, which for the time being Hawke had saved, had forgotten him and all his ships and crews, hence the well-known bitter stanza:—

"Ere Hawke did bang
Monsieur Conflans
You sent us beef and beer;
But now he's beat
We've nought to eat,
Since you have nought to fear."

Captain Newman, who commanded the *Hero*, 74, which was lost with every officer and man in December 1811, had been at sea for thirty years, in twenty of which he was not on shore six months.

That was the state of things which prevailed when the ship-of-the-line had become a great machine of war, capable of going to the most remote parts of the world. Occasionally ships had ventured round the globe and made protracted voyages; but it was not till after the fierce Dutch Wars that ships-of-the-line were dispatched as matters of course to distant seas. English ships had not yet reached that state of perfection which enabled them to keep the seas for long periods and to meet with reasonable prospect of success the finest of the enemies' vessels. But when the eighteenth century opened the ship-of-the-line had become a far different thing from the *Great Harry*.

At that period the interests of the Royal Navy were so well protected and statesmen saw so far ahead, that there was always an excellent reserve of ships-of-the-line. Many ships, indeed, especially the chief rates, were actually never put into commission. It was in connection with this state of things that currency was given to a remarkable story concerning the *Royal William*, a first-rate. She was launched about 1719, but was not employed for more than thirty-six years from the time of her completion, and never received any material inspection, or repairs that could be said to deserve that name, till 1757. "This ship," says Charnock, "was then found in so good a state as to be capable of being sent to sea in a very short time, and continued during the whole remainder of the war, not only in commission but employed in the most active service. Owing, however, to a defect in the construction, or formation, which rendered it extremely crank, an evil that subsequent practice caused a discovery of, and remedy for, 'twas considered expedient to cut it down, and reduce its force from a first-rate to that of a third, thereby causing it to mount 84 guns only. This measure was nevertheless taken solely on scientific grounds, having no reference whatever to the actual condition of the ship in respect to service. The prolonged longevity of the same vessel subsequent to the peace which took place in the year 1763, becomes a matter of no less wonder. After continuing almost uninterruptedly employed during the whole of the war, which commenced in 1778 with France, and in the ensuing summer with Spain also, it was not long afterwards, having undergone a survey

afloat in 1785, considered not unworthy of being converted into a guardship, a station from which it was scarcely considered necessary it should be dismissed, till after the close of the eighteenth century." Charnock adds that the mainmast of the *Royal William* is said to have been formed of a single tree, the growth of Scotland, and to have been brought from that country for the purpose. Having continued in store, however, for more than thirty-six years it was found on examination, when the ship was ordered to be fitted, so far decayed as to be unfit for service. Charnock observes cautiously, "This anecdote is certainly somewhat curious, on more accounts than one."

Masts had been made, however, from single trees, and were so constructed for many years. In 1666, Sir Edward Mansell, vice-admiral, seized a great tree which had been found in the Channel by a collier and taken ashore. The tree was 84 feet long, and had been in the water a long time, for it was covered with barnacles to a thickness of a foot. It was considered that the tree would make a good mast for a third-rate ship. A French ship, the *Fontenoy*, launched at Toulon just after the Crimean War, was remarkable for having her foremast made out of a single tree.

I am particularly interested in the details of the *Royal William*, as the original panel drawing of the vessel is in my possession. Time and careless usage have somewhat impaired the work; but the original colours are still wonderfully well preserved, and the marvellous detail and labour which the artist put into the picture are evident. An interesting feature of the work is the ensign, the ground of which, instead of

being white, as it is now, is a deep rich red. The model of the *Royal William*, as painted, is evidently represented in a large public room, such as an apartment in a palace or an Admiralty building. A scroll contains the following details :—

ROYAL WILLIAM

	Feet.	Inches.
Length for tonnage	140	7
„ „ $\frac{6}{8}$ gun-deck	174	0
Breadth, extreme	50	0
Draught of water afore	21	6
„ „ abaft	22	10
Burthen, 1869 $\frac{40}{94}$.		

MDCCXXIX.

The details as given by Charnock are :—*Royal William*, rebuilt at Portsmouth, 1719. J. Naish.

	Feet.	Inches.
Length of gun-deck	175	4
„ „ keel	142	7
Breadth	50	3 $\frac{1}{2}$
Depth	20	1
Tons	1918	
Men	750	
Guns	84	

In 1759 the *Royal William* brought home the body of General Wolfe, from Quebec; and in the same year she was Boscawen's flagship after Hawke's victory in Quiberon Bay.

Apart from the *Victory*, the most famous ship of the eighteenth century was the *Royal George*, whose dramatic loss has made her celebrated in all naval history. This ship was renowned from the very beginning of her life, for an uncommon length of time

was spent on her construction. Ten years passed between the day (8th January 1746) she was taken in hand, and that on which she was launched (1st February 1756). Even when work was not hurried at all, in those days, it was considered that three years were quite long enough for the building of such a ship.

When the *Royal George* was built she was considered to be not only the most beautiful ship in the world, but also the finest example of naval architecture in existence. She was a complete departure from the system of construction which prevailed up to the middle of the eighteenth century. Experience had shown even the almost immovable persons who were responsible for the British Navy that British ships of war were in many respects inferior to the best examples in French and Spanish naval architecture. British ships were so excessively long in proportion to their breadth, and were so deficient in bearings forward that they pitched so violently in a head sea that it was considered fortunate if they escaped without at least knocking all their masts out of themselves. Prejudice had to give way to facts and common sense. It was seen, and had to be admitted, that in some respects even the despised and detested foreigner could teach valuable lessons, and the *Royal George* was the outcome of copying and studying ships of other nations, especially those which had been captured and added to the British Navy. In spite of everything, however, the *Royal George*, although a first-rate vessel, was little superior in size to a Spanish prize named the *Princessa*, of only 74 guns, which had been added to our fleet.

The *Royal George* included one particular class of

ship only. Apart from her final fame she became celebrated for her achievements, especially in Hawke's great battle, when she bore his flag. She measured 66 feet from the keelson to the taffrail, and being a flagship her lanterns were very large—so big, indeed, that the men used to get into them to clean them. The ship's dimensions were :—

	Feet.	Inches.
Length of keel for tonnage . . .	143	5½
Length of gun-deck . . .	178	0
Extreme breadth . . .	51	9½
Depth in hold . . .	21	6
Burthen in tons, 2046 $\frac{80}{94}$.		

The timber expended in building her was :—

	Loads.	Feet.
Straight oak timber . . .	2309	6
Compass „ . . .	2306	40
Elm „ . . .	125	10
Fir „ . . .	214	8
Knees, square . . .	170	8
„ raking . . .	149	33
English oak plank, 4 inches thick . . .	135	8
„ „ 3 „ „ . . .	94	9
„ „ 2½ „ „ . . .	17	33
„ „ 2 „ „ . . .	15	4
Dantzick „ 4 „ „ . . .	174	14
„ „ 3 „ „ . . .	42	13
Elm „ 4 „ „ . . .	4	39
„ „ 3 „ „ . . .	2	0

Fifty cubic feet of timber made one load.

The *Royal George* was the oldest first-rate in the service. On 18th February 1756 she was hauled out of dock, at Woolwich, as it was at that time unusual to build such large ships on slips to launch. She was

pierced for 100 guns; but afterwards mounted 108. Though somewhat short and high, yet she was so good a sailer that she had carried more admirals' flags than any other British ship-of-war. From start to finish of her career she was a flagship, and amongst the famous admirals she carried were Anson, Boscawen, Rodney, Howe, and Hawke. The *Royal George* carried the tallest masts and squarest canvas of any English-built ship in the Navy, and originally the heaviest metal—namely, 52, 40, and 28-pounders. Her figurehead was two horses, one on each side of the bowsprit; both being in a rearing position, with saddles and bridles. They were painted white and formed a fine piece of decoration.

When the *Royal George* was lost she had on board a deadweight of 1031 tons, made up as follows:—

	Tons.	Cwt.
Weight of anchors	20	14
Guns	220	2
Shot	71	18
Powder	4	2
Ballast	550	0
Coals	50	0
Beef	12	2
Pork	14	2
Bread	43	0
Butter	2	0
Peas	14	0
Flour	9	0
Vinegar, oatmeal, smiths' forges, tools, cables, cordage, and sundries	20	0

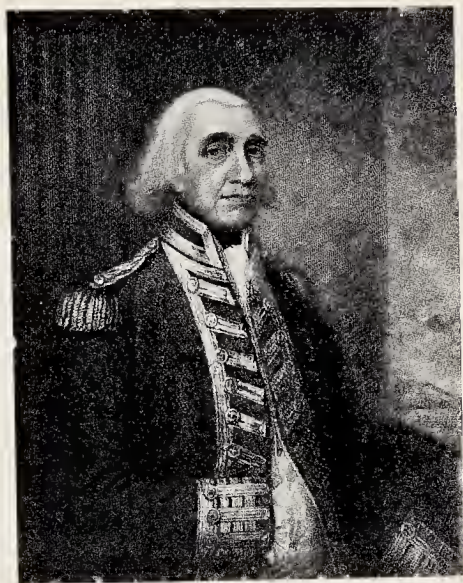
The tragedy of the loss of this noble and famous ship is the best known of all happenings in the history

of the British Navy. The *Royal George* had just returned from a cruise and was moored at Spithead, with Howe's fleet of between thirty and forty sail-of-the-line, a large number of frigates, and between two hundred and three hundred merchant ships. All were riding on a flood-tide, with their bows towards Cowes. At that time England had as opponents her rebellious colonies and France, Spain and Holland, and it was necessary to keep as many ships-of-war as possible in commission. No fewer than six admirals were flying their flags. Lord Howe, admiral of the Blue, was in the *Victory*, Barrington was in the *Britannia*, Sir S. Hood in the *Queen*, Milbank in the *Ocean*, Sir E. Hughes in the *Princess Amelia*, and Kempfenfelt in the *Royal George*. The *Victory*, *Barfleur*, *Ocean* and *Union*, all three-deckers, were lying near the *Royal George*.

On the morning of 28th August, 1782, while the decks were being washed, the carpenter found that the pipe which admitted water to cleanse and sweeten the ship, situated about three feet below the surface of the water, was out of repair. It was necessary to replace the pipe with a new one, and to do that the *Royal George* had to be heeled over so that the pipe could be reached. On the following morning, accordingly, the guns on the port side on the lower and upper decks were run out of the port-holes as far as they would go, and the guns on the starboard side were drawn in midships and secured by tackles. This brought the *Royal George's* port sills on the lower tier nearly level with the water. At about nine o'clock the last lighter, called the *Lark*, of 50 tons, laden with rum, went alongside and was unloaded. The extra weight of the men and spirit caused the *Royal*



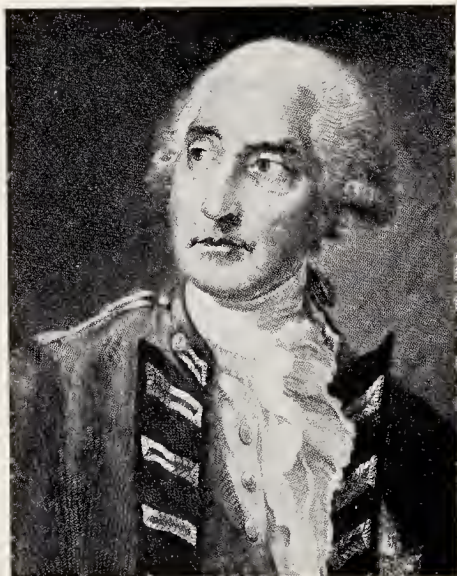
NELSON.



HOWE.



HAWKE.



RODNEY.

George to heel still more and the water to come in through the ports and enter the hold.

Twice the carpenter, who saw the peril of the ship, went to the lieutenant of the watch to ask that she should be righted.

In his account of the loss of the ship, Ingram, one of the crew, said that the officer of the watch was known as "Jib-and-Foresail-Jack" amongst the men, from a habit he had of troubling the crew unnecessarily to alter sail.

When the lieutenant was told that the ship could not bear the heel and must be righted, he snapped to the carpenter, "Damn it, sir, if you can manage the ship better than I can, you'd better take command." Almost immediately, however, he saw the danger, and ordered the drummer to be called to beat "Right ship."

The drummer was called, but before he could either get his drum or sound it the *Royal George* was sinking, and no drum that was ever beaten would have been heard above the dreadful chorus of the thousand men, women and children who were imprisoned in the massive walls and knew that the timbers of the *Royal George* would be their tomb. Most of them perished.

There was prolonged and bitter controversy as to the real cause of the loss of the *Royal George*. That which has been given has been generally accepted as the true one; but Sir John Barrow, in his *Life of Howe*, expressed the opinion that the real reason why she foundered was that the whole of her side gave way bodily, owing to her rotten state, and that on this account the Navy Board discouraged all attempts to raise her. Certainly it was not until 1839 that the hull was blown

to pieces, after many of the guns and stores had been raised.

Wonderful things were done by the old ships-of-the-line; but nothing more astonishing, courageous and successful stands on record than that unparalleled conquest by Hawke over the French fleet in Quiberon Bay on 20th November 1759. This famous battle was fought in a heavy gale of wind, amid the full force of the Biscay waves and on a lee shore whose rocks and shoals would have meant destruction if they had not been avoided. The achievement inspired contemporary writers to outbursts of lavish praise and thrilling description; but the best picture is left in the imagination by Hawke's own modest dispatch, written from the *Royal George* of fateful memory.

"All the day we had very fresh gales at N.W. and W.N.W., with heavy squalls. . . . Night was now come, and being on a part of the coast, among islands and shoals, of which we were totally ignorant, without a pilot, as was the greatest part of the squadron, and blowing hard on a lee shore, I made the signal to anchor. . . . In the night we heard many guns of distress fired, but, blowing hard, want of knowledge of the coast, and whether they were fired by a friend or an enemy, prevented all means of relief. . . . When I consider the season of the year, the hard gales on the day of action, a flying enemy, the shortness of the day, and the coast they were on, I can boldly affirm that all that could possibly be done has been done. . . . Had we but two hours' more daylight, the whole had been totally destroyed or taken."

It is doubtful if the steam navy of Great Britain will

ever be called upon to endure the privations which are on record in connection with some of the old ships-of-the-line. Steam and electricity have conquered space, and wireless telegraphy in particular has made it possible to locate disabled or stricken vessels. In these days a battleship may be, and sometimes is, made helpless owing to accidents; but it is most improbable that disease will cripple or weaken her. Yet the annals of the wooden navy are full of harrowing details as to the sufferings of officers and crews, especially the men, for they were by force of circumstance herded together and had no means of bettering their lot.

No story in the history of the British Navy is more terrible, moving and inspiring than that of the *Centurion*, the ship of 60 guns and 400 men in which Anson made his immortal voyage round the world in the middle of the eighteenth century. His little squadron consisted of rotten, unseaworthy ships which were not only undermanned but were also worked by crews consisting largely of worn-out old men and cripples. Part of his complement was to consist of land forces, and so it did; but these were out-pensioners of Chelsea Hospital who were so decrepit that they were incapable of service in marching regiments. Most of them were sixty years old; some were more than seventy. Of these pitiable specimens Anson was to have five hundred; but only half that number appeared on board, for the good and simple reason that every man whose legs had strength enough left in them to carry him, hurried off and hid himself.

Anson knew what the inevitable result would be of shipping such a wretched, helpless band, especially as he

had to round the Horn at the bitterest and most dangerous season of the year. Strong young men were likely to collapse under the strain and rigours of the voyage, and it was certain that aged pensioners could not survive. He sailed in September 1740, and from the day of his departure he had constant proof of the monstrous wrong and cruelty of those who had been responsible for organising the expedition. The foul and vermin-stricken *Centurion* was a floating pest-house. Some of the old men who had been forced to go on board never came up from below until they were carried on deck, dead, to be cast into the sea.

In doubling Cape Horn so terrific was the weather, and so excessively and incessantly did the *Centurion* roll and pitch, that a number of men were killed and others were badly injured. Not even the oldest and most experienced sailor on board had ever known such tempestuous winds and such enormous seas. The ship was so severely strained by the ceaseless motion that she grew loose in her upper works and leaked at every seam, so much so that she was saturated throughout and the officers seldom rested in dry beds. While fighting her way round the Horn scurvy made such havoc that in one month no fewer than forty-three of the *Centurion's* men perished of it, and after the loss of upwards of two hundred she could not muster more than half a dozen foremast men in a watch who were able to do duty. Her consort, the *Gloucester*, of 50 guns and 300 men, was in as bad a case or worse, for by June she had buried two-thirds of her complement, and of the survivors scarcely any were fit for duty except the officers and their servants. Provisions and water had run short—

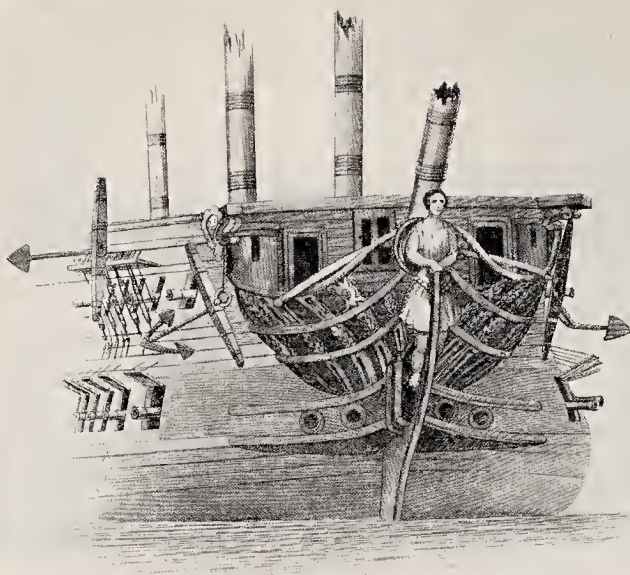
the latter so greatly that for a considerable time the men had only a pint each every twenty-four hours, and they would have died of thirst had not the *Centurion* rejoined the *Gloucester* and given her a fresh supply. Disease, bad weather, sorry specimens of humanity, and inability to remedy ailments at sea, made the *Centurion's* decks, to use Anson's own expression, "most intolerably loathsome," and if she had not reached land and given her people a rest and made it possible for the ship to be thoroughly cleansed, the valiant and unconquerable seaman would never have lived to return to England and bring with him that famous and splendid prize the Spanish galleon.

Anson had been sent to intercept a Spanish squadron which had been dispatched as hurriedly and as badly found as his own, and so severely was famine felt on board when the ships were battling round the Horn that rats, when they were caught, were sold for four dollars each. The most appalling measures were adopted to get food and drink, one man going so far as to sleep in the same hammock as his dead brother for some days, concealing the death so that he might get the double ration. Crews mutinied because of hunger and thirst, and the risings were only crushed by executing the ring-leaders. In the *Asia*, the admiral's ship, half the crew were lost; the *Esperanza* lost nearly 400 out of 450 men, and every soldier in a regiment of foot which she carried perished. But the most dreadful case of all was the *Guipuscoa*, a 74-gun ship. She leaked at every seam, her deck was at times deep in snow, and every day men fell dead at the pumps. The guns on the upper deck were thrown overboard and there was adopted that device which was often resorted to in the days of

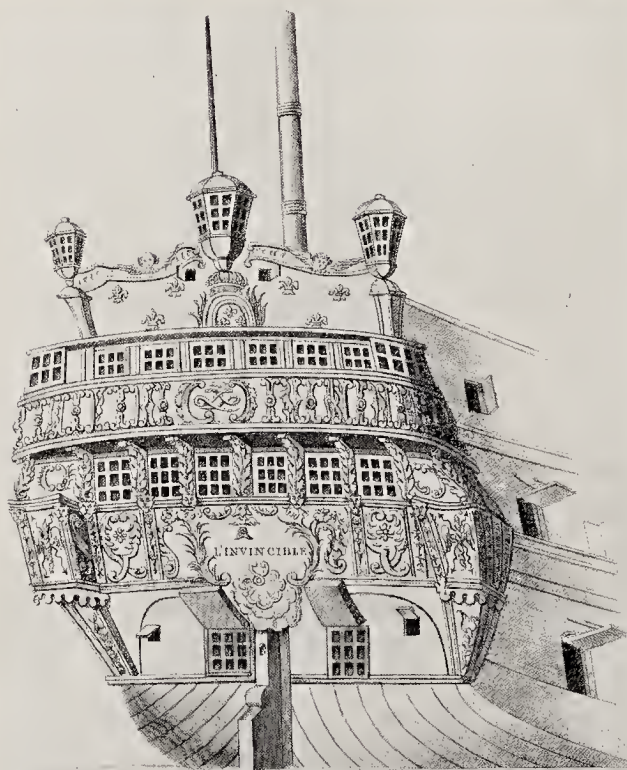
wooden walls to keep a ship afloat—six turns of the cable were taken round her to prevent her from opening, that is to say, the stout rope was literally wound round her to hold her together.

Anson's ships were not alone in their rottenness and unfitness for service; Hawke had much the same tale to tell of his own ship the *Portland* and the rest of his squadron. The *Portland*, of 50 guns, was so old and worn out that she was constantly leaking, and whenever it rained there was not a man on board who had a dry sleeping-place. When dismasted in a hurricane in the West Indies, the stumps of the masts when taken out crumbled to powder, and the foremast in particular was so rotten that a stick was driven a full yard into it. Instead of being broken up, as she ought to have been long before this time, the crazy vessel was repaired and took part some years later—in 1747—in Hawke's battle with the French off Ushant, but Hawke's flag was then flying in the *Devonshire*, of 66 guns.

The state of things which existed in British battle-ships was common to the other navies of the world, owing to the impossibility of preserving food and drink. Ships were crowded to excess, and when disease broke out terrible mortality was inevitable. The largest of the famous Manilla galleons carried no fewer than 1200 men, and the smaller ships, of 1200 tons and upwards, had from 350 to 600 persons on board. Nor were men the only living creatures, for at times large numbers of live stock were conveyed, adding of necessity to the discomfort and unwholesomeness of the ship. In the Spanish squadron which was opposed to Anson's the *Asia* had her waist filled with live cattle.



THE HEAD OF THE FRENCH *INVINCIBLE*.



THE STERN OF THE *INVINCIBLE*.

When the Revolutionary War broke out there was a great difference between the navies of England, France and Spain, the British ships being undoubtedly inferior in many ways to those of her opponents, especially the French. A particularly fine example of a French ship was the *Foudroyant*, which was captured in 1758. She was a two-decked ship of 84 guns and served as a model for ships of her class, with which much excellent work was done. One of the celebrated ships which appeared at this time was the *Queen Charlotte*. She was launched in 1790 and carried Lord Howe's flag on the Glorious First of June in 1794. The *Queen Charlotte* was to come to a distressing end. In 1800, when off Leghorn, she took fire and was completely destroyed, with the loss of more than 600 officers and men.

With the capture in 1747 of the *Invincible* from the French there came an increase in the size of British ships of the same force. The *Invincible* was a very fine ship and served as a model for many of those 74-gun ships with which so much was done in action. Amongst the vessels of this description which were constructed were the *Triumph*, the *Mars*, the *Thunderer* and *Canada*, all built about this time. The *Triumph* was laid down in 1758 at Woolwich and launched in 1764.

The *Thunderer*, 74 guns, taken in hand on 17th September 1756, and launched on 19th March 1760, was of the following dimensions:—

	Feet.	Inches.
Length of gun-deck	166	6
Length of keel for tonnage . .	136	0
Real rake of the stern	24	11
Rake of the back of the main-post at the wing-transom	1	4½

THE BATTLESHIP

	Feet.	Inches.
Breadth, extreme	47	2
Depth in hold	19	9
Burthen in tons, 1609 $\frac{3}{4}$.		

The total quantity of oak, elm, fir and other wood used in her construction was 3713 loads, 24 feet. Another ship of the same class, the *Canada*, of 1606 $\frac{3}{4}$ tons, launched in 1765, after being five years on the stocks, absorbed 3405 loads, 19 feet. The *Thunderer* and the *Canada* formed a new type of battleship which became a favourite, and the two ships were the greatest of all the favourites. After hard and almost unbroken service the *Thunderer* foundered in the hurricane which in October 1780 devastated the West Indies. The *Canada*, however, survived the perils and hardships of a long and costly war.

By way of contrast with the sturdy and honestly constructed *Canada* may be mentioned the case of her contemporary, the *Mars*, a 74-gun ship which was launched in 1759. She was one of Hawke's fleet at Quiberon Bay. During the subsequent peace she was found to need extensive repairs. As an experiment foreign oak was used, with the result that although the *Mars* was only inactively employed as a guardship, and that, too, for but a short period, she was found on survey to be so utterly defective that she had to be condemned as unfit for service.

As a result of long experience the building of 70-gun ships was discontinued. The last ship of this class was the *Boyne*, which was launched at Plymouth in 1766. Some years afterwards she came to a tragic end, for she blew up at Spithead and nearly every man on board perished. It was at this period also that considerable

changes took place in the classification of ships. Those of 60 guns were removed from the line, although as a matter of fact they took their place in the line for some time afterwards, but only occasionally. The smallest ship that was now denominated of "the line" was the 64, and her dimensions were much larger than they had been previously.

Throughout the French wars the 74-gun ship formed the backbone of the British Navy, and it was upon them that the burden of battle fell. Yet for a long time the authorities produced ships of this class which were hopelessly outclassed in some important respects by the 74's of the French Navy. Built on the old principles the British 74 was utterly inferior to the French 74, and the disparity was never more keenly felt than when vessels of this rate met in a heavy sea. It was found that the British 74 often enough, with a heavy sea running, or a fresh wind blowing, and the enemy to leeward, was unable to fight any of the lower-deck guns, yet the French ships, because of their greater breadth and stiffness, were not only able to keep their lower ports open but also to remain perfectly upright and fight their guns almost with as much ease as their opponents would have done in perfectly calm weather. But while in general excellence of design and handiness the French 74-gun ship was superior to the corresponding English vessel, there was often a lamentable inferiority in the construction and quality of the materials employed. So much was this the case, that many of the ships captured from the French were in such bad condition that they were useless as additions to the British Navy, and were never either fitted out or sent to sea.

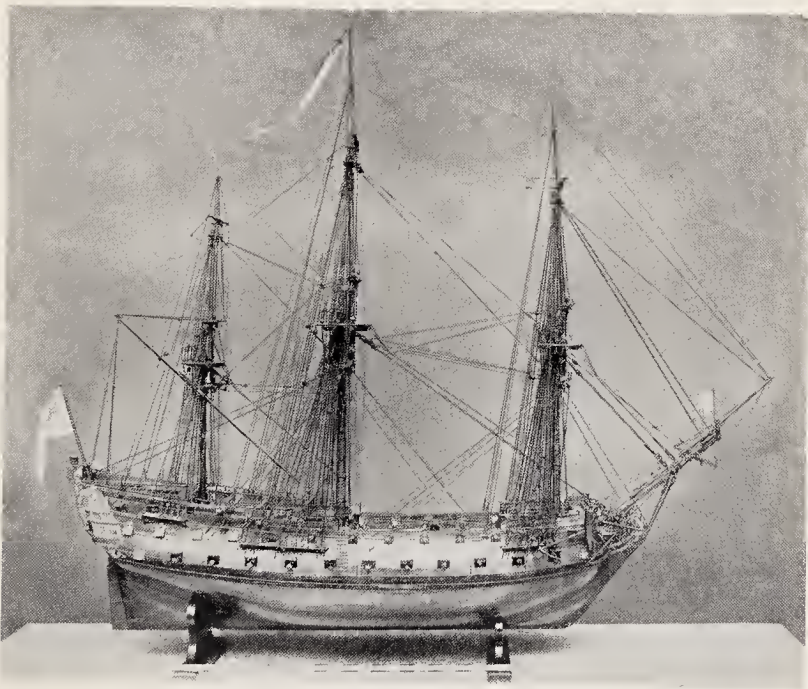
As French ships-of-the-line are so closely associated with our own naval history their principal proportions at the close of the eighteenth century may be given. These proportions, according to the Ordinance of 1786, were :—

	Ships of 120 guns.	Ships of 110 guns.	Ships of 80 guns.	Ships of 74 guns.	Ships of 64 guns.
Length from head to stern . . .	ft. in. 196 6	ft. in. 186-185	ft. in. 184-180	ft. in. 170 0	ft. in. 156 0
Breadth from out- side to outside of frame . . .	50 0	49 6	48 0	44 6	41 0
Depth in hold . .	25 0	24 6	23 9	22 0	20 0
Draught of water abaft, when light	17 6	17 4	17 0	15 8	14 6
Draught of water forward, when light . . .	14 0	13 8	12 0	10 10	11 1
Draught of water abaft, laden . .	25 0	24 8	22 6	21 6	19 9
Draught of water forward, laden .	22 8	22 2	21 0	19 10	18 9
Total weight of ship and stores when victualled and furnished for a six months' cruise . . .	(tons) 5246	(tons) 4910	(tons) 3825	(tons) 3548½	(tons) 2300
Height of lower battery from water . . .	ft. in. 5 4	ft. in. 5 0	ft. in. 5 6	ft. in. 5 6	ft. in. 5 0
Guns in the lower tier	32-36	30-36	30-36	28-36	26-24
Guns on the middle-deck .	34-24	32-24	...	...	...
Guns on the upper- deck	34-12	32-12	32-24	30-18	28-12
Guns on quarter- deck and fo'c'sle	20-8	16-8	18-8	16-8	10-6



South Kensington Museum.

MODEL OF THE ROYAL CHARLES.



South Kensington Museum.

MODEL OF A 64-GUN SHIP, ABOUT 1750.

The first ships which mounted 110 guns built in England were the *Hibernia* and the *Ville de Paris*, the latter being launched in 1795 at Chatham and the former in 1804 at Plymouth. The *Hibernia* was the larger vessel of the two, having a burden of 2508 tons, that of the *Ville de Paris* being 2531.

It was not until 1753 that any real attempt was made to overcome the evils caused by the foul air and bilge water in the holds of battleships. Adequate ventilation did not exist, and the poisonous air arising from the bilge and the crowded sleeping quarters affected not only the men, but also the ships themselves, for even the stoutest of oak timber could not withstand the action of carbonic acid and other gases which were generated in the confined spaces. In 1739 the ships in the squadron at Spithead anchored, "stunk to such a degree" that they infected each other, and the men became so dangerously ill from want of air that in order to recover their health they had to be put ashore. Efforts were made, but for a long time unsuccessfully, to overcome these evils; then, in 1753, Dr. Hales, by the employment of large air-pumps and windmills, introduced a system of ventilation which was exceedingly beneficial to both ships and men. The appliances were first introduced into the *Prince*, and for nearly half a century the doctor's principles were efficiently employed, until they were succeeded by improved methods.

Scurvy was a constant scourge in the old Navy, and in 1780 the Channel Fleet was so overrun with this disease and fever that it was unable to keep the sea after ten weeks. Diet banished the ailment, just as in our own day the Japanese have practically eliminated

beri-beri from their navy by a change of food and drink.

The problem of ventilating battleships has been a difficult one ever since these vessels took the seas. In the early days the trouble was insurmountable; later, by the employment of wind-sails and ventilators, it was largely overcome; but even to-day, with every help that skill, science, and money can contribute, the ventilation of a battleship is a baffling matter. The long-standing obstacle of providing efficient ventilation without too much cooling of the individual has to be overcome, and this, in a confined space, is not easy. It is strange that the evil complained of as prevailing in the 'thirties still exists, and men who are nearest to the ventilating orifices shut them up on feeling cold, with consequent suffering and discomfort on the part of their shipmates who are at some distance from the air-shafts. This drawback is intensified in bad weather, when it is necessary to make a battleship secure by battening down. It is essential for the safety of a ship that there should be a minimum possibility of water getting below, consequently all openings except the ventilators must be closed, and though powerful machinery and ingenious devices do much to purify the air below, still the atmosphere, with nearly a thousand men cooped up in a comparatively limited space, is dangerously deleterious. At the 1911 meeting of the British Association, which was held at Portsmouth, reference was made to this question of battleship ventilation by Mr. Leonard Hill, F.R.S., who declared that the conditions are such that a man with tubercle bacilli in his sputum is very liable to infect others whose

natural immunity is deficient. Men with tubercle, he added, ought to be at once weeded out of battleships ; which is certainly a reasonable suggestion, both for their own sakes and in the interests of their messmates. On the other hand, Fleet-Surgeon Whitelegg said it is extraordinary, considering the confined work of many bluejackets, how immune they are from any kind of illness. There was a remark made some time ago that the bluejacket hates fresh air. Fleet-Surgeon Whitelegg asserted that this is not the case, and that the sailor loves fresh air, but hates a draught. That is perfectly true, as any one knows who has travelled in a smoking compartment crowded with bluejackets. It is sometimes hard to tell the colour of the uniform from that of the atmosphere.

Even to-day, in spite of all the improvements that have been made in connection with the ventilation of battleships, there occasionally happen accidents for which no satisfactory explanation can be offered. Such an accident took place in H.M.S. *Superb* in the summer of 1911, when three men lost their lives, two through being suffocated by poisonous gas that had accumulated in the battleship's hold, and one, Edward Coll, an able seaman, in a gallant effort to save his comrades. The *Superb* had left Portland with the rest of the fleet to take part in the Coronation Review. The lower port provision hold was stored with potatoes, soap, and corned beef. This was not the usual place to store potatoes, but the ship was filled up with provisions. Most of the other ships had proper potato lockers, but the *Superb* could carry only a day and a half's supply. It was reported that there was a bad smell in the hold,

and instructions were given for the hold to be ventilated. Eventually men went down, with the result that two were poisoned and Coll lost his life. So bad was the vapour that Commander Howard described it as like taking gas at the dentist's. Surgeon A. C. Rusack stated that the men were asphyxiated by carbon dioxide gas, generated by decayed organic matter, and he had found that some of the potatoes were diseased. The gas, he added, was similar to that which is often found at the bottom of old wells, and that in all his experience he had never known a case like this.

CHAPTER V

THE TRAFALGAR PERIOD

EXCLUDING modern battleships, most people are more interested in the ships-of-the-line of Nelson and Trafalgar than in any other period of our naval history. The causes for the preference are obvious. No sailor ever made a more successful claim to British hearts than Nelson; no ship ever won greater fame than the *Victory*. Nelson seems a real and living person, and the *Victory* is still afloat.

Some absorbingly interesting sidelights on the Navy of Nelson's time are thrown in a scarce work by Captain Layman, R.N., published in 1813. The little volume bears the somewhat cumbersome and unpromising title of *Precursor to an Exposé on Forest Trees and Timber, &c.*, and the writer dealt with this subject in relation to the maritime strength and prosperity of the United Kingdom and Provinces. In an appendix he gave an outline of the dimensions, force, and conditions of the British Navy compared with that of the enemy.

In an address to the Duke of Clarence, Captain Layman said that the facts contained in his pamphlet had been mostly drawn from official documents and actual experiments; and in a manuscript note he added, "When the Duke of Clarence commanded the *Pegasus*

in the West Indies he applied twice for Mr. Layman, then in the *Amphion*, afterwards blown up. The Duke *then* showed some zeal for the service."

Layman had strong views of his own, and did not hesitate to express them, in connection with naval matters. He was a man who was keenly interested, too, in the particular question with which he dealt, and he spoke from personal experience in various parts of the world. Above all, he had many intimate discourses with Nelson, and was able to ascertain much that was passing through the great commander's mind. He states that on board the *Victory* Nelson declared to him that without better ships (for those were the best that would last the longest) the Navy would be ruined; and he pointed out several in the fleet which, but for the spirit and skill of their commanders, would have to be sent home, although the force could ill admit of that being done. "I should break my heart," said Nelson, "if the French fleet were to put out and I was not able to pursue them."

Matters by that time had become so grave in connection with ships-of-the-line and other war vessels, that in the House of Lords, six months before Trafalgar was fought, it was stated that a return had been prepared of ships-of-the-line in commission, with their condition, and it was found that there were thirty-seven which might probably last five years, twenty-seven which might last three years, and seventeen which were fit only for home or limited service. That statement was made in May, 1805; and it was declared that in the previous May not even one-half of the British fleet was equal to five years' duration of actual service, and that the real decrease or

consumption of line-of-battleships from decay was ten or eleven annually.

With the exception of a few ships which gave proof of uncommon excellence of construction, most famous of all being the *Victory*, the majority of the ships with which good work was done at the Trafalgar period were those which had been captured from the French and Spaniards. Shipbuilding was a haphazard, happy-go-lucky business ; but it was recognised that the dimensions of warships should be brought to a certain size and standard according to the several classes. The authorities considered that ships-of-the-line should be so constructed with respect to their dimensions, guns, masts and yards as to be able to carry their lower tier six feet above the water, with four months' provisions on board, and stores for foreign service. Yet in spite of all that was done officially the English yards remained inferior to the French and Spanish, and English ships continued to be built on the foreign models, the best vessels still being those which had been taken as prizes. The *Deptford*, which was built by the Surveyor of the Navy, and was expected to prove an unrivalled success, although constructed to carry 60 guns, proved to be so imperfect that she was reduced to a 50-gun ship and was afterwards turned into a hulk. The *Pembroke*, of 60 guns, launched in 1757, was so erroneous in formation as to be spoken of by the sailors as the "Carpenters' Mistake." She also speedily became a hulk. Indeed, says Layman, so little understood was naval architecture as a science that when the existing *Victory* was launched in 1765, instead of carrying her lower tier six feet above the water, as required, she had her midship-ports when fitted

for the Mediterranean only 3 feet 11 inches above the level of the sea ; and the *Namur*, built from an Admiralty design, had her lower-deck ports only 3 feet 8 inches from the water.

By way of comparison in this respect two ships may be mentioned, the *San Josef*, Spanish built, and the *Hibernia*, launched at Plymouth in 1804. The *San Josef* was of 2457 tons, and with six months' stores on board and stowing 487 tons of fresh water, had her midship lower deck ports 5 feet 4 inches above the sea-level. The *Hibernia*, of 2498 tons, with five months' stores on board and stowing but 336 tons of fresh water, had her midship lower deck ports only 4 feet 7 inches above sea-level.

Ships which were supposed to be the same in proportion varied in the most remarkable fashion. For instance, the *Ajax*, a 74, had nearly 400 tons of ballast ; but the average for a 74-gun ship was 280 tons.

Owing to ignorance in ascertaining displacement and masting, some ships proved to be bad sailers and so crank as almost to capsize. One ship was so lopsided in launching that 35 tons of ballast were needed to bring her upright.

The prolonged wars were making immense demands on the oak forests, and the supply, both from the royal forests and from private property, was almost exhausted. In 1802 the consumption was so much greater than the growth that it was feared that the supply would cease altogether. Vast quantities of oak were used on the Thames alone, in the merchant-yards, for the building of most of the 74-gun ships of 1700 tons averaged about 2000 loads for each ship. The cost of building, too, had



BREAKING-UP A SHIP-OF-THE-LINE.

grown enormously in some cases. The *Hibernia* cost £125,390, nearly £50 4s. a ton, and the *Ocean*, 2270 tons, cost £128,050, nearly £52 1s. a ton.

The inevitable result of an unusual demand was the inferiority of much of the workmanship and the employment of methods which proved disastrous to ship and life. Foreign oak and other timber were tried and proved a hopeless failure. At Boston, New England, a trial had been made of American oak, and a ship called the *America*, of 40 guns, was built. On reaching Portsmouth she was found to be totally unfitted for service, and was never again fitted for sea.

After the French War began in 1793, the wear and tear of ships became greater and the use of foreign timber increased. So great was the scarcity of English oak that foreign fir was used in the building of ships, with the result that some of them were condemned for firewood in two or three years. German timber was imported, some of it costing more than £16 a load, but more than half of it proved "rotten, ringy, and unserviceable." Two 74's were built of this timber by way of experiment—the *St. Domingo*, launched in 1809, and *La Hogue*, launched in 1811, from the King's yards; but both were in a state of decay in 1812. Yet so also was the *Ajax*, built by contract in 1809 of English oak, that being so new and so violently treated as to be incapable of endurance.

The most notorious of these cases, however, was that of H.M.S. *Queen Charlotte*, of 100 guns, launched at Deptford in 1810. Despite the unsatisfactory experience of foreign oak, she was constructed, excepting the frame timbers, of Canadian oak and pitch pine. Without

ever having been on service she proved in a state of decay which was called the dry rot in less than twelve months. Amazing as it seems, the ship, after occupying a most useful dock at Plymouth for a year and a half, and being in a great measure taken to pieces, was rebuilt with the same kinds of timber.

In a list which he prepared of the ships of the Navy at the time of writing, 1813, Layman made the depressing manuscript note concerning a table of ships-of-the-line, "All more or less defective." One 74, after a thorough repair three years after launching, was in two years as bad as ever. "*Clarence* has the rot and the *Prince Regent* is found totally defective in stability." Of ship sloops he added with the pen, "The whole of these craft proved unfit for service." The *Ocean*, launched in 1805, was in a defective condition in twelve months.

Captain Layman put on record much that was undoubtedly true concerning the state of the Navy at the period of which he wrote. Numberless contemporary writers had something to say to the same effect. Amongst them was Vice-Admiral Lovell, who left a vivid picture of the condition of naval matters of the Trafalgar era. He sailed in a ship-of-the-line, the *Kent*, 74, which was ordered home because she was badly in need of repair. Lovell found the ship extremely weak, and her timbers, from the looseness of several bolts, working very much. This caused the ship to make a good deal of water—in fine weather from six to eight inches per hour, and in bad weather two feet, which kept on increasing to nearly four feet, until the *Kent* reached England. Yet it was in ships of this

sort that long cruises were made and the exhausting and protracted blockades carried out—blockades for which there was neither glory nor prize-money. For nearly fourteen months British ships-of-the-line were cruising off Toulon “amidst nothing but gales of wind and heavy storms of most terrific thunder and lightning.”

Almost incredible carelessness and neglect characterised the conduct of naval affairs, even at this most glorious period, when the very salvation of the country depended on the efficiency of the fleet, and particularly the ships-of-the-line. In 1800, H.M.S. *Athénienne*, a 64-gun ship, was sent out to Malta only half manned and with no copper on the bottom. She was in company with other cripples, for the *Généreux* also was not half manned, and not only that but in a gale of wind she rolled away all her topmasts and sprung a leak. She forced her squadron to put into Minorca and was never again able to accompany it.

Lightning was at this time, as it had been and remained throughout the period of sail, a source of great danger to ships of war, many of which doubtless vanished as the result of being struck and their magazines being exploded. During a fierce thunderstorm in the Mediterranean in 1800, a squadron of British ships was struck by lightning. The *Dragon*, 74, and the *Renown*, 74, were struck, the former being damaged and having a man killed, and the latter's mizen-topgallant-mast dashed to atoms, the topmast shaken into laths and the mizen-mast set on fire, while some tin and iron pots in the gun-room were perforated as if a bullet had gone through them. The lightning went out of one of the gun-room ports. “If the *Renown*,” says Lovell, “had

been one of the old 74's, whose mizen mast stepped in the after magazine, she must have been blown up ; but fortunately hers stepped in the gun-room."

That constant blockading and cruising of the Trafalgar period was a heavy and incessant strain on both ships and crews, and particularly on the officers. The anxiety was constant when ships were sailing in two or three lines in heavy gales and thick weather. Ceaseless vigilance and a most strict and careful lookout, with the best of discipline, were needed to avoid accidents. "To the very great credit of the officers of the watch," says Lovell, speaking of Channel cruising in 1800, "scarce an accident occurred during the long, tiresome and harassing blockade of Brest."

During these long cruises the junior officers were hard pressed to find a bit of linen to put above their black cravats. Soap was as scarce as clean shirts and stockings ; and it was a common thing to turn shirts and stockings inside out and make them do a little more duty. Such articles of luxury as tea, potatoes and other stores for the messes were non-existent during the cruising off Sardinia ; but bullocks were got on board and killed as wanted, and oranges were plentiful.

There were admirals and captains who, in spite of all difficulties and discouragements, succeeded by personal influence in training their officers and men to a high state of discipline and efficiency, particularly in gunnery. Amongst them was Collingwood, whose ship, before he changed his flag to the *Royal Sovereign* for Trafalgar, was the *Dreadnought*. Collingwood incessantly practised the crew with the guns to ensure quickness and accuracy of fire, encouraging the men by assuring them that if in five

minutes they could deliver three well-directed broadsides no vessel could resist them. By perseverance and personal superintendence, he trained his men to achieve not only this uncommon rapidity of fire, but to become so smart and skilful that they could fire three broadsides in three and a half minutes. The result of this preparation was evident as soon as the *Royal Sovereign* got into action at Trafalgar, when at one time she had to fight five opponents. Her first discharge was from a carronade loaded with a round shot and a keg of 500 musket-balls; then she proceeded towards the great Spanish *Santa Ana*, which Collingwood had chosen as his opponent; and into her immense and vulnerable stern he fired a broadside and a half which shattered her, dismounted fourteen of her guns, and killed or wounded four hundred of her crew. Collingwood personally looked along some of the guns to see that they were well laid, and when the *Royal Sovereign* and the *Santa Ana* were close together he specially praised a negro who, while the admiral was at his side, fired ten times point-blank into one of the Spaniard's port-holes. So amazing, indeed, was the *Royal Sovereign's* fire, that Captain Tyler, of the *Tonnant*, afterwards said that he was so much astonished at the manner in which the *Royal Sovereign* opened fire that for a few moments he could do nothing but watch and admire.

At Trafalgar some of the enemy's ships were painted like the British, with double yellow sides; some with a broad single red or yellow streak; others were all black; and the *Santissima Trinidad* with four distinct lines of red, with a white ribbon between them. The *Santa Ana* was painted all black. The enemy had the iron

hoops round their masts painted black. Nelson saw this, and orders were issued by signal to whitewash the ships of his own fleet, so that in the event of all the ensigns being shot away they might be known by their white masts and hoops.

The appearance of the *Santissima Trinidad* was imposing, Lovell said. Her head was splendidly ornamented with a colossal group of figures, painted white, representing the Holy Trinity, from which she took her name. "This magnificent ship was destined to be our opponent. She was lying-to under top-sails, topgallant sails, royal, jib, and spanker; her courses were hauled up, and her lofty towering sides looked beautiful, peering through the smoke, as she awaited the onset."

A few days after the action Lovell was sent on board the *Santissima Trinidad* to help to get the wounded men out of her before she was destroyed. "She was a magnificent ship and ought now to be in Portsmouth Harbour. Her topsides, it is true, were perfectly riddled by our beautiful firing, and she had, if I recollect right, 550 killed and wounded; but from the lower part of the sills of the lower deck ports to the water's edge, few shot of consequence had hurt her between wind and water, and those were all plugged up. She was built of cedar, and would have lasted for ages, a glorious trophy of the battle; but 'sink, burn and destroy' was the order of the day, and after a great deal of trouble, scuttling her in many places, hauling up her lower deck ports—so that when she rolled the heavy sea might fill her decks—she did at last go unwillingly to the bottom."

Some of the old ships-of-the-line were fast sailers, and in favourable weather could maintain a speed which

was greater than that of several of the earliest ironclads. There are cases on record of sailing ships-of-the-line crossing the Atlantic in a shorter period than was needed by a steam battleship, whose greatest speed was twelve knots an hour.

The *Victory* was a fast sailer ; also the *Royal Sovereign*, which was the first English ship to get into action at Trafalgar. Her copper was quite clean, and she outstripped all the other ships of the lee division, which she led, the *Victory* leading the weather division. A crippled ship, such as the *Victory* was after Trafalgar, was a more or less helpless object, in proportion to the damage she had suffered. The *Victory*, which reached Gibraltar after the fight, left that port on 4th November, but did not arrive at Spithead until 6th December, having been more than a month in covering a distance of 1000 miles—a run which a modern battleship will easily cover in four days, and the latest type of battleship-cruiser, hard driven, in two days.

The period of greatest glory in the British Navy was at the beginning of the nineteenth century, a time which was soon to be crowned by the triumphant battle of Trafalgar. In 1800, England had in commission a hundred ships-of-the-line, as well as seventeen two-deckers which were not of the line, not reckoning frigates and other inferior vessels. There were twenty-four ships-of-the-line either being repaired or in harbour waiting to be repaired. Of these two dozen ships-of-the-line no fewer than thirteen were foreign built, having been captured from our enemies, as well as 125 lesser ships which were also prizes. The total number of ships-of-the-line at that time in commission or unfinished

was 138, with a tonnage of 314,557. Compare that state of things with the condition of affairs in 1817, two years after Waterloo had been won, and when England appeared to be so sated with victory that she allowed the Navy to go to ruin through neglect. At the beginning of 1817 there were only fourteen ships-of-the-line in commission; eighty-four line-of-battle ships, which were considered fit for further service at sea, were lying in ordinary, many of them neglected and rotting; while no fewer than forty ships-of-the-line were reckoned unfit, even by the neglectful authorities of the day, to be again put in commission.

From the time the war began, in 1793, to October 1801, there had been taken from the French, Dutch, and Spaniards no fewer than 516 vessels of all classes, and of these 81 were ships-of-the-line—45 French, 25 Dutch, and 11 Spanish. During the short interval of peace between the close of that war and the renewal of hostilities in 1802, the naval establishment was greatly reduced, the line-of-battle ships falling from 104 to 32. A great number of ships which were completely worn out and unfit for service were either sold or broken up, while some—including seventeen of the line—were converted into other classes.

In spite of all neglect, indifference, and carelessness, England showed that she was still capable of grappling promptly with a crisis, for when, on the 18th May 1803, war was declared against France, the ports and dockyards of the kingdom set instantly to work to fit out and repair ships, and so expeditiously was the task fulfilled that in less than a fortnight no fewer than twenty-eight line-of-battle ships had been put into commission, as well as a proportionate number of smaller vessels.

It is fascinating to dwell on the picture, which arises in the mind, of those strenuous efforts in the ports and dockyards of the stirring days of constant fighting with one, two, or three enemies, singly or in combination. However zealously the shipwrights worked, their speed was limited by the resources available. There was little difference between the methods they employed and the system which prevailed in the time of Henry the Eighth, when the Royal Navy came into being. Labour was slow, tools were simple, locomotion was sluggish, and everything was in keeping with the spirit of an age in which no uneasiness was caused if a vessel took three months to cross the Atlantic. Timber had to be felled at great distances from shipbuilding centres, and even when the roughing-out had been done and much surplus material disposed of, it was a slow and laborious business to convey the wood either by sea, canal, or road. During the daytime natural light enabled the workers to proceed with their task; but if necessity demanded, as it so often did, that work should be continued during long hours of darkness, then the black night was illumined by the lurid glare of burning torches, and blazing tar barrels, as well as lamps and other primitive devices. Yet, simple though these lights were, they were just as much in keeping with the gnarled, unyielding oak which was being unwillingly and stubbornly worked into a noble battleship, as is to-day the powerful electric installation which enables workers in modern shipyards to continue the construction of a modern mammoth irrespective of the daylight.

Until 1798 all the work in connection with the important undertakings at the dockyards, especially Ports-

mouth, was done by men and horses; then, slowly and carefully, steam and machinery were introduced, the guiding spirit in this direction being General Sir Samuel Bentham, who had been trained as a shipwright at Woolwich Dockyard. He was a man of great tact and ability, and saw the industrial danger of too precipitately substituting steam for human labour. One of his earliest efforts was to establish machine sawmills, and even the distrustful workmen saw at once the enormous advantage of steam over manual and horse labour. This was the beginning of a revolution in naval construction, and the opening of that era of mechanical power which has reached its present amazing and impressive state.

At the time of Trafalgar metal-mills were erected for the manufacture of cast and wrought metals which were needed for naval purposes, for the ease, value, and economy of iron was being recognised, and its superiority to timber clearly proved. When wood alone was used in shipbuilding, it was frequently necessary to wait long periods until a piece of timber of the right natural shape for a special purpose could be found, and in the meantime work on a particular ship was partly or wholly suspended. The comparative ease with which metal could be dealt with made a vast alteration in the length of time necessary to complete a ship. Simultaneously with these improvements was the advent of block-making machinery at Portsmouth—an apparatus due to the invention of Sir Isambert Brunel. The machinery was completed in 1808, and Brunel was rewarded with the sum of £20,000, equal to a year's saving in expenditure as the result of his discovery.

The time was rapidly approaching when there was

to be an end of timber-built ships, although there was still to be fought the last of England's battles with wooden walls—Navarino.

For more than two centuries there had been great, and at times enormous, demands, on the timber supply of the country, and millions of oak trees were under cultivation for the shipbuilding purposes of the Navy. In the early days, under Henry, the total tonnage was trifling—less than 13,000; but in the reign of Charles II. the Navy had a tonnage of more than 100,000, and the total rose until in 1806 it was 776,057, and 800,000 in 1810—a figure which remained a record for the age of wooden walls, for in 1837, at the death of William IV., it had shrunk to 536,033. Ten years later, when steam was an important element in the Navy, the total tonnage was 645,550. In 1608 the total amount of timber which was fit for the Navy was 234,229 loads, most of which came from the New Forest, and in 1783 the total was 50,455, of which the New Forest supplied no fewer than 33,666 loads. In 1608 the number of “decayed trees” far exceeded the usable timber, but in 1783 it was considerably less than the timber fit for the Navy. The woods and forests supplying timber were the New Forest, Aliceholt and Woolmer, Bere Forest, Whittlewood Forest, Salcey Forest, and Sherwood Forest.

The vast needs of the Navy could not from time to time be met by home-grown material, and it was necessary to import foreign timber. In connection with these foreign substances experiments were made which were as revolutionary and disastrous as many of the changes that have been attempted in very recent years. Then, as now, only actual performance could give satisfactory data; a ship

had to be built and fully brought into being before her bad or good qualities could be known. So it was with vessels that were constructed of material other than honest British oak.

Oak was imported from Canada in 1763, when that country became part of the British Empire, and the importation went on for many years. The timber, however, was found to be deficient in the necessary qualities for the Navy, and in particular, to decay rapidly. The *Devonshire* was in 1812 planked with Canadian white oak, but in five years the timber was utterly decayed. German oak, too, proved rotten, as was shown by the cases of the *Blake*, 74 guns, built in 1808, and the *Domingo*, built in the following year. These ships did not last more than five years, while the life of other ships, built of foreign material, was even shorter.

Italian oak was found to be the best general substitute for English oak, a great advantage being its curvature. Larch, fir, pitch-pine, and timber from the Cape were employed with more or less success; but teak proved very durable for many purposes, and an excellent substitute for English oak.

Ships-of-the-line in 1800 cost £21 per ton to build, but in 1806 the price had risen to as much as £35 per ton. At the close of the Trafalgar operations, however, the price fell, and from 1807 to 1810 was only £33 10s. In 1771 a 64-gun ship was built in a private yard at the cost of £16 12s. 6d. per ton. Great sums of money were often spent in repairing ships which were not worth restoring, and often enough the thorough renovation of a ship cost as much as the construction of two new vessels.

CHAPTER VI

BEEF AND BEER

NEARLY two hundred thousand gallons of beer and a large herd of cattle went towards the victualling of the *Great Harry*. Beer was the drink of the nation in Henry's time, and for many generations afterwards ; it was the chief beverage of the Navy for nearly four centuries. It was not until 1831 that the beer ration was abolished. The disciples of cocoa—saddening and sustaining drink—have yet to prove the superiority of that refreshment over beer as a ration for fighting men. We have been mercifully spared a practical demonstration of what the modern British Navy can do on a large scale. Though there is not a patriotic Englishman who does not in his heart of hearts believe that the issue is assured, yet the fact remains that the most glorious days of the British Navy are those of beef and beer and wooden battleships. Meat and drink were often putrid, because there were no means of keeping them fresh ; wooden walls, even the finest and most carefully designed and honestly constructed, were pestilential dens ; men were outcasts from ordinary society, some officers were ignorant barbarians ; but in spite of all these miseries, the crews whose greatest sustenance was beef and beer secured the most amazing victories. It is doubtful whether in these days

officers and men could endure the hardships and discomforts of the long reign of the ship-of-the-line.

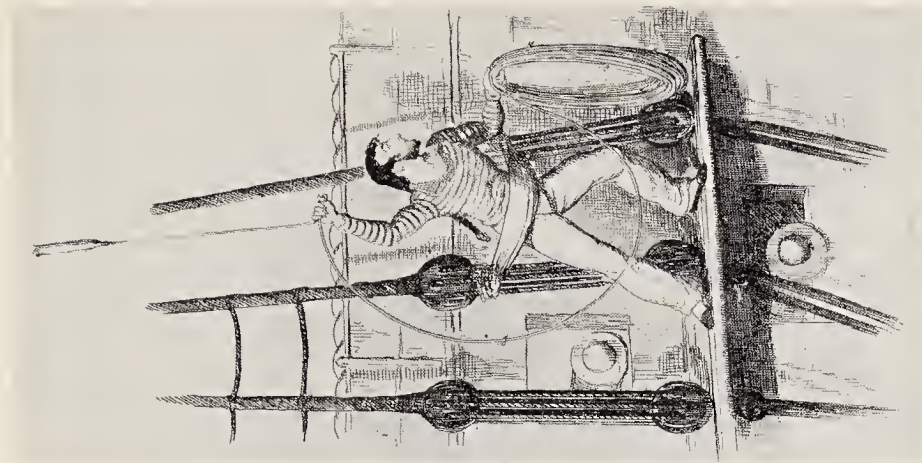
From the very beginning of the Royal Navy bad food and drink and worse accommodation and sanitary arrangements have swept away far more men than were ever lost in battle. The Armada itself was crippled through badness of food and drink, and by consequent sickness, long before the conquering English fleet was seen, and Elizabeth's triumphant vessels, which had come out of the contest almost unscathed, were ravaged by death. Contemporary seamen and writers tell mournfully how mortal were the outbreaks in the ships. The very ship which Elizabeth had named after herself lost nearly half of the 500 men who formed her crew. Lord Howard, in describing what had happened, said that he had taken out the ballast, and had lit fires of sweet broom in her hold for three days together to try and purify her. He bitterly complained that although the beer had been condemned and was undrinkable, still it was served out to the men. "Nothing doth displease the seamen more than sour beer," he added, and that opinion was shared by innumerable commanders who succeeded him.

A gallon of beer daily was the allowance to every man and boy in the Navy at the time of the Armada, and that ration remained practically unaltered until it was discontinued. There was a quart for the morning, a quart at dinner, a quart in the afternoon, and a quart in the evening—a spacious quantity, and a harmless one, if the liquor had been good, for men at sea in those days needed plenty of food and drink to sustain them. In quantity the beef was liberal, but too often it was bad and uneatable, and butter and cheese were unpalatable



George Cruikshank.

THE VETERANS.



George Cruikshank.

HEAVING THE LEAD.

and rancid. Sundays, Tuesdays, and Thursdays were "flesh days"; Mondays, Wednesdays, and Fridays were fish days, but on Fridays only half allowances were made.

Beer remained the chief drink on board ship, but when it became customary to make long voyages, after the discoveries and adventures of Drake, Raleigh, and the rest of that famous band, brandy was issued to soldiers and men who were voyaging in transports to sickly countries. For the passage to Virginia two gallons of brandy were allowed to each man, a little of which was given every morning to the soldiers, and a quantity being kept for use after landing. The quantity seems large, but the passage from Gravesend to Virginia was eleven, twelve, or thirteen weeks, and notoriously deadly. In 1676 the King was sending 1000 soldiers to Virginia, and it was assumed that many of them would die. In a ship's people numbering a hundred, fifty had been known to die during the voyage, and most of the survivors arrived sick and weak. The estimate for transporting 1000 men to Virginia at that time was a little more than £8 a head. Once they were on board, every precaution had to be taken to keep them from deserting. There was only one sure plan of gaining this result, and that was to get as far from land as possible until the ships finally sailed.

The twelfth of August 1693 was a sorry day for the British fleet, which was cruising off the Lizard, for the ships were ordered to half allowance of beer. Very bad weather had prevailed while the fleet had been at sea. The ships were leaky and defective and the victuallers had not joined the fleet. So serious was the question of

food and drink that on 6th August a council of war was held on board the *Britannia*, forty leagues south-west of Ushant. There were present no fewer than fourteen admirals. The state of the whole fleet was considered, and it was found that there was only "twelve days' beer upon an equal dividend, and that the fleet might run great hazard of perishing for want of beer should we remain longer on this station, in regard the winds may prove contrary." It was accordingly resolved that "if the victuallers do not appear within twenty-four hours, we make the best of our way to Torbay with the fleet, where, in all probability, we may find the victuallers." Further than that the council resolved that if the fleet did not reach to the eastward of the Deadman by the 11th, every flag officer should order his division to go to half allowance of beer.

More cheerful was the decision of a council of war held in the *Britannia* when she was off the Lizard on 15th August. The flag officers decided that in consequence of advice received that the victuallers were met in latitude 57°, the fleet should go on for Torbay, "for if we should miss the victuallers (as we have already) at sea, we should inevitably perish for want of drink, being already at half allowance of beer; besides that in Torbay we can take in our provisions with more dispatch than at sea."

The fleet went into Torbay, and on 19th August another council of war was held on board the *Britannia*, when the flag officers present expressed the opinion that as the year was so far spent, and the land forces in the fleet very few and sickly, it was advisable not to attempt anything on the coast of France, "for that

the damage which may be done to the enemy is not equivalent to the hazard the fleet will run."

No sooner was the fleet in touch with the land than the seamen deserted whenever they found a chance of escaping, although they knew that the penalty for the offence was death. On 4th September, owing to daily desertions from the fleet, a court-martial was held on board the *Britannia*, at which Michael Cashall and Thomas Legg were sentenced to death. A singular slip was made in connection with these two men. The Lords of the Admiralty had ordered that Legg should not be tried; but, owing to a change of secretaries in the fleet, the order was mislaid. "It consequently slipped our memories," added the admirals ingenuously, "and we beg you accordingly to solicit the Queen for his pardon." On 3rd October a warrant was issued for inserting the name of Thomas Legg, "tried and condemned to death on board the *Britannia* at St. Helen's for deserting the service, in the next general pardon for poor convicts of Newgate, without condition of transportation." On 6th October Queen Mary signed a warrant for Legg's pardon.

Naval matters in 1693 were almost hopelessly bad. Money was scarce and could not be got, even to pay the wretched creatures who were forced to toil and suffer in the fleet. Battleships and other ships were rotting through neglect and official incapacity, and the admirals despaired of remedying the evils. "The seamen sicken very much," they said in a letter to the Commissioners to the Admiralty, dated at Gosport, 27th September, "and leave their ships by every opportunity, so that if care be not taken and effectual orders given to the

civil magistrates for seizing, stopping, and securing them on the roads, we conclude it will be impossible to keep the fleet manned."

There were no hospitals ashore to which sick sailors could be sent, and accordingly they were accommodated in cottages and other dwellings, where they suffered inevitable neglect, for the cottagers, already poor enough, had their burdens vastly increased by the quartering upon them of seamen for whose maintenance no money was forthcoming from the authorities.

Melancholy was the case of the *Charles* galley which, in December 1693, while proceeding from Ostend to Scotland with land officers, was forced to put into Harwich. Stormy weather had damaged her severely, and she could not proceed without repairs. Besides that, there was a "violent contagious disease aboard," between sixty and seventy men were down, and a lieutenant was dangerously ill. The officers and soldiers had buried an ensign and nine or ten of their men. The captain had returned to Harwich and put all the sick men ashore, three of whom quickly died. There were only eight days' allowance of provisions on board.

Throughout the whole of the history of the ship-of-the-line there were serious complaints concerning the quality of the beef and beer, and even within the memory of old officers and men who are still living there existed the state of things described by Vice-Admiral Lovell as prevailing in the year 1800. Scurvy, he said, had begun to appear because of the long continuance at sea of the ships, and the use of bad salt food and other provisions of the worst quality. "The bread was full of maggots and weevils, the flour musty and swarming with insects,

the water so putrid, thick, and stinking, that often have I held my nose with my hand while I drank it strained through my pocket-handkerchief; and we were so short of this necessary article that our consumption was limited to two pints a day for all purposes. Provisions were not like those supplied nowadays from Her Majesty's stores; everything then was done by an infamous job contract; Government paid through thick and thin for everything, and we poor devils had to suffer in consequence of the neglect of those persons under Government winking at the nefarious jobs of contractors, and no doubt they had weighty reasons for so doing. I recollect in a mid's berth, we used to ask what such-and-such a county was famous for. Suffolk, in our black book, was put down as famous for supplying the Navy with rotten and bad cheese. Burgoo was served out with treacle for breakfast, instead of nice, wholesome cocoa and sugar; and will it be believed that until the peace of 1802 French merchants had a contract for supplying the British Navy with French brandy, while our West India merchants knew not what to do with their rum and cocoa! At last John Bull awoke from his dream, and it struck him that soldiers and sailors liked rum just as well as brandy, and that, by giving them cocoa for breakfast, it would not only assist the West India merchants, but give general satisfaction throughout the fleet."

A vast stride towards improvement was made at the close of the eighteenth century, when the victualling of the Navy was put on a permanent basis, and the callous and cruel frauds perpetrated on the seamen, particularly by pursers, ended. "Pursers' weights," as they

were called, were abolished, and the nominal ration became the real ration of the sailor, who from that time entered upon a period of improvement which has never ceased, and which has reached the present high level.

Beef and beer were the mainstay of the men who won Trafalgar, for the seaman had his daily allowance of a gallon of the liquor and 4 lb. of beef weekly. The beer was a standing daily allowance, so also was the pound of biscuit, making 7 lb. weekly; but pork, peas, oatmeal, butter, and cheese were issued at longer intervals. The total weekly allowances were: Biscuit, 7 lb.; beer, 7 gals.; beef, 4 lb.; pork, 2 lb.; peas, 2 pints; oatmeal, 3 pints; butter, 6 oz.; cheese, 12 oz. Tea and cocoa were occasionally issued as substitutes for cheese and butter, but beer was the great liquid stand-by. When beer was not available, or was utterly undrinkable, half-a-pint of spirits was allowed daily, the dram, however, not being issued neat, as it was considered even at that period that dram-drinking was a pernicious habit, and commanding officers were empowered to order such an addition of water as they considered fit. Butter was an article which did not keep well, and, when necessary, oil was substituted for it, though doubtless there was little difference between the oil and the butter, especially in hot weather; and wheat, barley, rice, sugar, and molasses were issued in place of biscuit, cheese, peas, and oatmeal, by way of changing the diet. Every time salt beef was issued, a proportion of suet, flour, or raisins was substituted for half the beef. Twice a week, when possible, fresh beef or mutton was issued in place of salt beef or pork. During the long periods of harassing blockading, when the fleets were

forced to keep at sea, with no chance of communicating with the shore except at rare intervals, the fresh beef and mutton were mythical articles; but when in port matters were very different, and sometimes the fresh beef and mutton would be issued more often than twice weekly. In harbour, the weekly allowance of fresh beef was $3\frac{1}{2}$ lb.; salt beef, 2 lb.; and pork, 1 lb.

It was about this period that fresh vegetables were first supplied to the Navy, as a result of representations made to the Admiralty by some of the oldest and most experienced pursers then serving. Vegetables were clearly reckoned a valuable commodity, for their issue was not to exceed in value that of the peas saved, and they were to be boiled with the meat, so that the men should have "no room to murmur on account of the saving of peas." The cooking was crude and imperfect at best, and probably it did not much affect the meat or the vegetables to be boiled together; indeed it is likely that the two things were improved by the process. The cooks in the Navy at the time were Greenwich pensioners, and it was still the custom to deliver the meat by "pricking" for it without favour either to the officers or anybody else. The cooks were strictly ordered not to give the men the skimmings of the coppers in which the salt meat had been boiled, "to mix with their puddings."

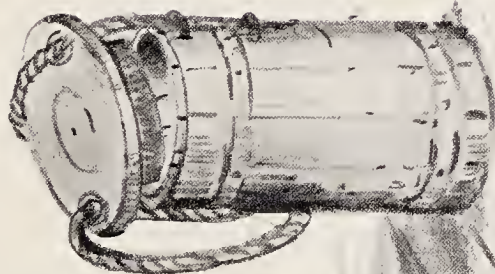
Each man was allowed to take up tobacco at the rate of 2 lb. monthly, at the price of 1s. 7d. per lb., which was $\frac{1}{2}$ lb. weekly; but it is somewhat difficult to understand how that quantity could be consumed, as the most stringent regulations were in force concerning smoking—rules which were essential in view of the appalling risks

from fire. Neither officer nor man was allowed to smoke in any place but the galley, and the insufficiency of such a confined space in a ship-of-the-line carrying nearly 1000 men is obvious. The purser doubtless profited largely from the impossibility of officers and men smoking comfortably and considerably, for he received a commission of 10 per cent. on the tobacco issued, this being calculated on the price charged to the buyers; and this perquisite and many others not only earned for a purser the name of "Old Nipcheese," but also enabled him to accumulate a considerable fortune. A purser in a ship-of-the-line received £4 16s. a month, with an allowance of £25 on his accounts being passed; but he had many other sources of income, including 5 per cent. on the sale price of slops, 5 per cent. on the sale of dead men's clothes, 10 per cent. on the amount paid for "savings," $\frac{1}{2}$ d. per man daily for supplying the ship with coals, wood, and candles, an allowance for the waste of one-eighth of all provisions issued, and payment, at the rate allowed for "savings," "for all such provisions as he may appear creditor for," at the end of a commission. The system obviously enabled a cunning and dishonest purser—and most of them seem to have been of this character—to prosper considerably at the expense of men who were captured and forced to serve their country.

The established daily allowance of provisions in 1825, and for several years afterwards, was as follows: Bread, 1 lb.; beer, 1 gallon; cocoa, 1 oz.; sugar, $1\frac{1}{2}$ oz.; fresh meat, 1 lb.; vegetables, $\frac{1}{2}$ lb.; tea, $\frac{1}{4}$ oz. When fresh meat and vegetables were not issued there were allowed, in lieu of them, salt beef, $\frac{3}{4}$ lb., and flour



AN OLD SHIP'S HOUR GLASS.



AN OLD CARTRIDGE CASE.

$\frac{3}{4}$ lb. ; or salt pork, $\frac{3}{4}$ lb., and peas, $\frac{1}{2}$ pint, alternately ; and weekly oatmeal and vinegar not exceeding half-a-pint each. On the days when flour was ordered to be issued, suet and raisins or currants might be substituted for a portion of the flour—1 lb. raisins, $\frac{1}{2}$ lb. currants, or $\frac{1}{2}$ lb. suet equalling 1 lb. of flour. There was further latitude with regard to provisions, and substitutes could be given for the provisions mentioned. For instance, $1\frac{1}{2}$ lb. of soft bread, or 1 lb. of rice, or 1 lb. of flour equalled 1 lb. of biscuit ; 1 lb. of butter equalled 1 lb. of sugar ; 2 lb. of cheese were equivalent to 1 lb. of cocoa ; and 1 oz. of coffee or $\frac{1}{2}$ oz. of tea were equal to 1 oz. of cocoa. The equivalent of a gallon of beer was a pint of wine or quarter of a pint of spirits. The most frequent substitutions were spirits for wine or beer, and of tea or coffee for cocoa or chocolate.

Beer was supplied on the home station, while ships were in harbour, or during a short period after leaving, because at sea it could neither be conveniently stowed nor kept for any length of time ; consequently, wine or spirits mixed with water were more extensively used than formerly. Occasionally wine was issued, but spirits, generally rum, were almost universally used at sea throughout the service, from the end of the war with France. The practice of substituting wine or spirits for beer prevailed until 1831, when the beer ration was abolished. Ten years later, wine, in place of spirits, was issued only on the Cape of Good Hope station—and that ration has long ceased to be provided at all.

Before 1825, half-a-pint of spirits, when spirits were

issued, was allowed to every person serving in the fleet; then a beneficial change was made by reducing the quantity to a quarter of a pint daily, with an allowance of tea or coffee instead. It was the custom to divide the half-pint of spirits into two equal parts, one of which was taken at dinner-time and the other in the afternoon; but tea or coffee took the place of the afternoon allowance of spirits. Contrary to expectation, the substitution of tea and coffee for rum was well received, and immediately there became apparent an improvement in the general health and moral well-being of the men of the Royal Navy. Rations were good and plentiful, in so far as they could be made so by supervision and care; but there were, which was inevitable in wooden ships, still many instances of bad provisions and foul water.

Simultaneously with these improvements came the new method of preserving water on ship-board—by substituting iron tanks for wooden casks. “When water was kept in casks,” says the writer of the Introduction to *Statistical Reports on the Health of the Navy* (1841), “it became slightly fœtid, from the disengagement of hydrogen, in a few days, and in a fortnight or three weeks so loathsome as to be swallowed with repugnance, even when called for by urgent thirst. The progress of decomposition and its nauseating results were especially rapid and offensive when the water was most pure, at least when it contained the smallest proportion of mineral admixture and the temperature was high. When the solid food at sea consisted almost exclusively of very salt beef and pork, biscuits long baked, and puddings made of salt, suet, and flour, the

desire for—even the necessity of—abundance of water was great. No one who has not felt it can imagine the distress that was often endured within the tropics, setting aside the effects on health, from the intense thirst thus excited, and the only means available for quenching it—water so putrid and offensive, often so thick and green, from vegetable admixture and decomposition, and emitting so strongly the foetor of rotten eggs as to disgust at once the sense of smell and of taste.” In iron tanks water was found to suffer no change in itself from decomposition, however long kept. Tanks were introduced partially into ships of war before the year 1815; and after that period they were used throughout the service, and by keeping the water fresh and wholesome contributed largely to the good health of the Navy.

When Queen Victoria came to the throne there were five different messes in the Navy. These were: The admiral's, or captain's, table; the ward-room mess, for naval lieutenants, marine officers, master, purser, surgeon, chaplain, and schoolmaster; the mess of the mates, midshipmen, assistant surgeons, and clerks; the mess of the warrant officers; the mess of the seamen and marines. Between the first and second messes there was not much dissimilarity; but there was a great difference between them and the rest, both in food and drink. It was generally possible to keep the chief messes supplied with good things, if they were at all available, and they were usually to be had, for immense improvements had taken place in the Navy, especially in the preservation of food and drink. In the inferior messes, however, there was still much room

for improvement, but this was gradually being brought about, and with the general introduction of steam into the Navy life on board fighting ships was revolutionised, and sea-dogs of the old school looked in vain for real links with the wooden walls which they had loved so well.

A revolutionary change was made in 1901 in the issue of naval rations. A committee which had been appointed to inquire into the question, under the chairmanship of Vice-Admiral Rice, suggested reforms, which were carried out at a cost to the country of £187,000 a year. Additions to the existing ration were made with respect to tea, sugar, coffee, fresh vegetables, and raisins; and for the first time jam and unsweetened condensed milk were included. The committee were somewhat restricted in their operations. They were instructed that whatever other recommendations they might make they must not suggest the abolition of the system of "savings," nor suppress the canteens or place them under direct Government control. "Savings" is the name given to a custom which has prevailed in the Navy since 1799, when it was legalised. Under that system a man need not draw his whole ration, but may forego a portion of it, and receive instead a fixed monetary payment. The ostensible purpose of this arrangement was to benefit the men, and though in the beginning it was applicable only to special articles, yet at present a bluejacket may surrender the whole of his official diet except salt, oatmeal, split peas, and celery seed. In the Channel and on foreign stations, however, only one-third of the fresh meat is allowed to be given up, and the committee desired that this rule should be universal in the fleet.

The first question which engaged the attention of the committee was that of the supply of staple provisions of the kind which can be stored in large quantities at depôts, and keep fresh and wholesome for a considerable period against the arrival of a sudden emergency. After the most careful deliberation the committee determined that it would be exceedingly difficult, if not impossible, to frame an "ideal ration," and that it would be unwise to attempt to make any radical alteration of the men's dietary. Careful inquiry was made as to the quality of the provisions supplied, and it was concluded that they were of first-rate quality when bought, but that owing to the practice of "saving" and the necessity for maintaining large reserves for war, some of the articles "were older when issued than was desirable." In order to obviate the consequences which might result from the shipment in a "deteriorated" condition of such things as salt and preserved meats, flour, biscuit, and suet, it was proposed that a certain limit should be set upon them, and that having reached it they should be disqualified for the mess-table.

That was one of the matters to which earnest and unprejudiced consideration was given by the committee, after careful hearing of the complaints and suggestions of witnesses, a proceeding which differs vastly from the old method of managing naval affairs. The committee, indeed, worked on the sound principle that the Government is responsible for the victualling of the fleet, and that no dependence should be placed on canteens, bumboats, etc.; that the ration should be sufficient in itself to satisfy all reasonable requirements of the men, and able to maintain them in a fit state of

health ; and that it should be one which can be immediately supplied on all stations, either in peace or war.

As to the nature of the food supplied, the committee were convinced that the arrangements for obtaining supplies were on the whole satisfactory. There had been, however, some difficulty with regard to fresh meat. There were Government slaughter-houses at Gosport, Plymouth, Portland, and Malta, and no fault had been found with the quality of the consignments. But at places where the butchers were private contractors it was found that receiving officers were sometimes reluctant to enforce with sufficient vigour the conditions stated in the specifications. Slight imperfections, for example, were apt to be overlooked when the rejection of the meat would have delayed the cooking of the dinner, and in certain cases considerations of cost were allowed to influence the placing of orders. With the object of reducing the possibility of this remission to a minimum, it was recommended that Government abattoirs should be built in the Sheerness and Chatham districts, and that quality alone should be estimated in deciding as to the acceptance of all articles supplied for use by the seamen.

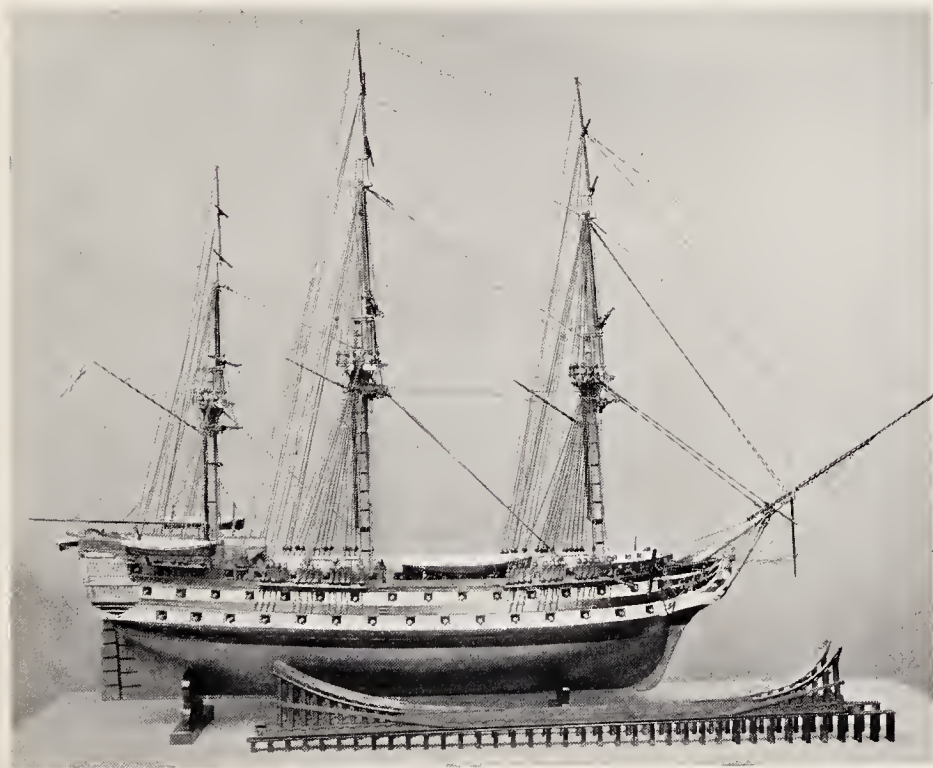
The important feature of the change, however, was that which was contemplated in the dietary scale. Excepting condiments, the new daily fare of the bluejacket was : Bread, $1\frac{1}{2}$ lb. ; fresh meat, 1 lb. ; vegetables, $\frac{1}{2}$ lb. ; oatmeal, 3 oz. ; sugar, 2 oz. ; chocolate, 1 oz. ; tea, $\frac{1}{4}$ oz. ; spirit, $\frac{1}{8}$ pint. When fresh provisions were not obtainable, salt beef and pork, split peas, celery seed, preserved potatoes or rice, and the materials for plum-duff are served out in set proportions in their stead. " Fresh meat " means beef, the flesh of the sheep having been until recently



E. W. Cooke, 1828.

H.M.S. *PRINCE*, FIRST-RATE, 110 GUNS.

Shewing the stern balconies, as built before the close sterns
were introduced.



South Kensington Museum.

H.M.S. *VANGUARD*, 1835.

ignored as an article of food. It was considered that the dietary was somewhat monotonous, and that there should be a greater variety, consequently the 1 lb. meat allowance for the midday dinner was reduced to $\frac{3}{4}$ lb., the balance being available for another meal. It was considered that this change would be highly satisfactory to the men, since the full meat ration was very seldom taken up. It was further suggested that mutton, which so far had been only in experimental use, should be given as a change when the men wanted it, provided that it did not cost more than beef. When preserved provisions had been inevitable it had been customary to have salt pork every other day; but the committee proposed that this should take its place in regular alternations with cured beef and tinned meats.

With respect to Navy flour the committee remarked that it is not intended for the purpose of making bread or pastry; but is an accompaniment to the salt beef and preserved meat rations only for making puddings. The seamen have for long objected to this coarse and dirty-looking but "highly nutritious" article; and the committee considered that in future their prejudice should be respected, and they should be provided with a "higher-grade" flour. The idea that it might be advisable and possible to fit bakehouses in the ships was not favoured.

The question of grog, the dose of which was to be dealt out at dinner-time, was to be left to the commanding officers, who were to have discretionary powers as to the time at which it should be issued in future; and this was almost the last blow to those whose faith had followed the flag of beef and beer.

The net result of the committee's efforts was to give

two more meals a day to the bluejacket. The existing state of things provided for three :—

Breakfast on turning out, about 5 a.m.

Dinner at noon.

Supper at 4.15 p.m.

As a matter of practice, however, the men had been accustomed to put in two extra meals, one about 8 a.m., at the “stand easy,” and the other at the end of the day’s work, about 7.30 p.m. In the opinion of the committee the time had come to recognise officially these informal meals, and in order to make the five meals possible the time set apart for intervals for refreshment was extended from $2\frac{1}{2}$ hours to 3 hours 35 minutes.

Routine in Harbour was suggested as follows :—

5 a.m.—Lash up and stow hammocks. Cocoa.

8 to 8.45 a.m.—Breakfast. “Clean.”

12 to 1.15 p.m.—Dinner.

4.15 to 4.45 p.m.—Tea. Shift clothing.

7.30 to 8 p.m.—Supper.

Routine at Sea.—The meals to be at the same times as in harbour, except that cocoa will be issued to the morning watch after mustering, and to the rest of the hands when hammocks have been stowed.

Reliefs.—The reliefs for guards and duty men were to get their meals and relieve as follows :—

Breakfast, 7.30 a.m. Relieve at 7.55 a.m.

Dinner, noon. Relieve, 0.30 p.m.

Tea, 3.30 p.m. Relieve, 4 p.m.

Supper, 7.30 p.m.. Relieve, 8 p.m.

Nothing could more clearly show the difference between the new and the old way of looking at the grog ration than the fact that when the committee’s recommenda-

tions were known, even the proposal to empower commanding officers to order the spirit to be issued in the evening was favourably received.

There is little doubt that the American bluejacket is far more highly paid and better fed than the bluejacket of any other Navy, though in many ways he is closely followed by the British tar. In these instances the voluntary system of enlistment prevails, and in the other cases impressment is in force, with a corresponding system of pay and victualling. By reason of the high wages paid in the United States to all classes of workers, it is necessary to establish a relative standard for the Navy, the result being that the American seaman is treated in a manner which is unknown in Europe. When the American battleship squadron visited the Thames in the autumn of 1910, considerable astonishment was expressed at the liberality and lavishness of the men's diet and the way in which they were treated generally. For many years, however, the question of the physical comfort and well-being of the American man-of-war's man has received the most careful attention, and ten years ago it was found that a system of co-operative catering had proved highly satisfactory. The experiment was tried in the battleship *Kearsage*, and a report upon it was made by Medical-Inspector J. C. Boyd.

It was found that the general messing of the *Kearsage* was satisfactory. The paymaster of the ship was the caterer, and a chief yeoman, designated as commissary-yeoman, was detailed for that purpose. He gave his time exclusively to the dietary of the men, seeing that the food was properly prepared, and making all mess purchases under the paymaster's supervision.

There were 501 men in the general mess, divided into 26 separate messes, and for each mess a landsman or coal passer was detailed to act as mess attendant, his duties being to arrange the table, bring the food from the galley, wash the dishes, and see to the general cleanliness of the locality of his mess table.

Of the 26 messes 11 were located on the berth-deck and 15 on the main-deck. Nine cooks were employed, six in the galley and three in the bakery. The galley cooks divided the twenty-four hours into two watches, beginning at 1 p.m. daily, three being on watch at once, and one of their number, a first-class cook, being in charge of the watch. The cooks in charge were responsible for the proper preparation and cooking of the food. They personally superintended the distribution, seeing that no waste took place, and that it was properly served.

The bakery, which was located forward on the main-deck, was in charge of three cooks. In port, when fresh bread was received on board daily, the bakers used about 1000 lb. a week for additional bread, and when the ship was at sea between 3000 lb. and 4000 lb. of flour were used weekly in supplying the crew with fresh bread.

It was undoubted that the legal allowance of food was more than enough to satisfy the men's wants. On board the *Kearsage* one-fourth of the rations was commuted. The commuted-ration money, with the profits from the sale of articles in the ship's store, brought the general mess-fund up to about 1500 dollars (£300) per month. Part of this money was paid to the ship for additional quantities of certain portions of the ration, such as pork, beans, flour, etc., and the balance was expended on shore for fresh pork, ham, pigs' feet, sausage,

cheese, eggs, potatoes, butterine, jelly, and many other articles which are usually consumed on land. A cold storage room was provided for the use of the crew ; and in this 6000 lb. of beef, about twelve days' allowance, could be stowed without difficulty.

On board the *Kearsage* the general mess had worked satisfactorily, and it was recommended that the method should be substituted for the individual messing system which was in general use throughout the service. The advantages claimed for the custom were that it answered the liquidation of all outstanding obligations before the ship left port ; it simplified work, and regulated the manner of messing the men ; secured uniformity in the character of the supplies furnished to each mess, and prevented overcrowding and confusion in the galley by reducing the number of separate mess cooks ; it abolished the necessity of transporting to and from shore a large number of mess caterers, several times weekly, for the purpose of buying supplies and settling individual mess accounts ; it deprived many of the mess caterers of the temptation to expend mess funds carelessly, and lessened the opportunity for "irresponsible financial methods" in their dealings with market men, merchants, and others ; and by centralising the messing system under one head it limited the number of caterers and cooks, and so restored a large body of men for service in the several divisions of the ship, and thus increased the ship's military efficiency.

A successful feature of the *Kearsage* was the ship's store, organised for the sale of articles generally found in a variety store. It was under the management of a commissioned officer. All purchases and the settlement

of bills were a part of his duties, and his accounts were audited quarterly by a board of officers.

Generally speaking, the messing system of the *Kearsage* was regarded as a co-operative establishment in which all purchases made contributed to the improvement of the general mess, and at the same time excellent articles were procured at reasonable prices. No alcoholic drinks were sold in the ship's store, all such stimulants being strictly prohibited by the regulations.



TARS CAROUSING.

George Cruikshank.



SATURDAY NIGHT AT SEA.

George Cruikshank.

CHAPTER VII

WOMEN IN BATTLESHIPS

FROM the Hard at Portsmouth you may look towards the *Victory*; then behind you at the train-like row of public-houses. At the back of these refreshment-places you may enter labyrinths of little dwellings, clustering near the spot where Peter the Painter was hanged for firing Portsmouth Dockyard (his mummied finger, which was used as a tobacco-stopper, is in the Museum in the High Street, not far from the George Hotel, where Nelson slept in England for the last time). The *Victory*, the public-houses, and the warren-like retreats of fellow-creatures stand as links with those old days of sail which gave to England some of her most glorious triumphs and many of her greatest miseries. Men were bludgeoned into the Navy, flogged into discipline, robbed of their rights, and rooked of anything they had left by the abandoned women who, until a century ago, were allowed free access to the *Victory* and the stout old consorts who have long since left her and been broken up. The association of women with the Navy was one of the most disastrous features of the days of sail.

One of the earliest instances of women going to sea in ships-of-war is recorded by Nicolas. The period was the end of 1379, when a "fatal event" happened by

which England lost several of her most distinguished warriors. An expedition to Brittany had been organised, and two hundred men-at-arms and four hundred archers had been assembled at Southampton, where a small fleet was in readiness to convey them across the Channel. Unfavourable weather prevented the force from embarking at once, and accordingly quarters had to be provided for them. It was November, and apparently the officer in command, Sir John Arundel, had no mind to encamp. He preferred comfortable quarters, and insisted, in spite of the remonstrances of the abbess, upon accommodating his men in a neighbouring nunnery. Then followed a shameful scene of outrage, robbery, and sacrilege by the barbarous soldiery. The nunnery was full of women, married, widows and young ladies of rank, and they were indiscriminately assaulted. So monstrous was the crime that the priests followed the licentious brutes when they embarked, and with bell, book, and candle excommunicated and anathematised them. Some of the women had been forcibly carried on board the ships; others had gone willingly. In all they numbered sixty. When the ships got to sea a gale sprang up, and the wretched craft were hurled about for several days. Men who had acted as the soldiers had behaved might well have been expected to do what they actually did—they seized the women, and in spite of all their piteous prayers and agonised appeals hurled them overboard, to lighten the vessels. Finally, in the middle of December, some of the ships which had kept afloat went ashore on the south coast of Ireland, and a few of the noble knights and their esquires and followers saved themselves. Arundel, whose ruffianism had been maintained to the end, for he

had assaulted and killed men who disputed his savage orders, was swept away and drowned. It is supposed that more than two dozen of his vessels were lost ; and of the men who got a footing ashore some perished through exposure. The survivors included Sir Thomas Percy, who does not seem to have been a party to the outrages. While he and his crew were utterly exhausted by their sufferings they were attacked by a Spanish ship which was full of troops, in the expectation of an easy victory ; but after a resolute fight Percy made a prize of the attacking vessel, which he took to England and "pawnd" for £100 ; then he sailed to Brest. The storm in which Arundel's fleet was shattered and dispersed was uncommonly severe, and in it there were lost a number of ships which had been assembled to prevent his expedition from landing in Brittany.

The unhappy fate of the women who went to sea in ships of war in those early days, which are supposed to be imperishably associated with chivalry and noble knights in shining armour and gallant plumes, was repeated from time to time in later ages when women ventured afloat in fighting ships, especially those of the line.

Women accompanied the ships of the Armada when they sailed from the Peninsula to conquer England, though they were not present in large numbers in that lumbering and unhappy fleet. Few of them survived the horrors of the fighting and the crowning dangers of the storms which Elizabeth piously believed to be the breath of Providence, expressly directed to the annihilation of the foe. In the barbarous periods of privateering and piracy women went willingly or were forcibly taken

to sea, and the time came when, in British battleships, they were officially permitted, in small numbers, to accompany their husbands to sea. Matters in this respect were at their worst during the long wars with France, which ended, so far as the sea was concerned, with Trafalgar; but for some years before and some years after that conflict ships-of-the-line and other ships-of-war, but especially the big vessels, were floating dens of infamy when in port, nor can this be cause for wonder when the system of manning the Navy and treating seamen is remembered. The spirit of the age was that of war and immorality, the latter inevitably following the former in the case of men who were pressed into service and kept as rigidly to their ships as prisoners were confined in hulks and gaols. The consequence was the presence at every naval port of enormous numbers of disorderly women. To such vast proportions had the evil grown, that at one period of the war with France there were in the neighbourhood of Portsmouth and Gosport alone no fewer than twenty thousand disorderly women.

An "old naval surgeon," writing in 1824, in an earnest appeal to the officers of the Navy to crush out the prevalent immorality, declared that hitherto sailors had been too much considered as machines, and that no care whatever had been bestowed upon their moral welfare. He spoke of them as being the most thoughtless and improvident beings alive, as weak and helpless as children, and said that the most determined seaman on board ship became, when in port, the most irresolute being imaginable, the easy prey of immoral women and Jews. At sea discipline and attention kept him in order ;

but in harbour restraint was instantly removed. Disorderly women swarmed on board. Officers, too, frequently set a bad example in receiving improper women on board to themselves, though not so often as formerly ; yet they were not excluded from the ward-room or mid-shipmen's berth, while a large number of the most abandoned creatures were admitted to the men, which invariably tended to disease, and to enervate and unfit them for duty.

The number of women who infested a ship varied according to circumstances ; but women were keenest to hurry on board when it was known that much pay or prize-money was due to the men. It had been long a general custom to receive on board a ship-of-war "a mass of the most abandoned women, who are domesticated with our men and boys. . . . Upon a ship's going to sea, after refitting in the harbour, the list of sick is sometimes frightfully enlarged from the intemperance the men have continually indulged in with the women, from the diseases which they have contracted from them, and from the atmosphere being so deleterious in their sleeping-places."

Even at that time, when the ship-of-the-line had reached the zenith of her fighting glory, when she represented centuries of experience and skill, her interior was almost as crude and horrible as when ships were first gunned for battle. The lower deck of a ship-of-war was, even in ordinary circumstances, packed with men, each of whom was allowed only fourteen or sixteen inches breadth for his hammock, yet to that human mass was added, in port, a great increase in women. The result was that the health of the crew suffered

greatly through breathing fetid and impure air. A ship became so indescribably unclean that even the strictest of first lieutenants found it impossible to keep the decks wholesome and healthy.

Drink added to the dangers and horrors of promiscuous immorality. Women defied all orders, and cunningly evaded all watchfulness, so that large quantities of spirits were smuggled on board, with resultant scenes of the wildest vice and riot. Ordinary authority was impossible of maintenance, and the only cure for a ship's company was to get to sea. Captains frequently declared that a long continuance in port so disorganised a ship that extended time was needed, with rigid discipline, to restore the vessel to a normal state of order.

It was the custom when a ship arrived for the men's wives to go aboard to their husbands, and they were compelled either to witness the prevailing orgies or return to the shore. Some of them remained, and quickly sank to the level of the most abandoned, and many respectable seamen, particularly those from the North of England and Scotland, chose to forgo the company of their wives to the shame and misery of seeing them domesticated with abandoned women. Unable to endure the sights on board, many good men deserted. Some of the younger officers, especially the midshipmen, who had left refined homes to join the Navy, were swiftly ruined by the vice around them, and, says the surgeon, "I have myself known several fine lads die a miserable death, the consequence of the unrestrained facility afforded them to persevere in their debauched habits."

The midshipman, while on board, was helpless. He inevitably saw and heard all that was happening, and was forced to live in the same habitation as the most disorderly characters, and, in some classes of ships, on the same deck with them. Once a woman got her man she never let him go so long as he had money. When the ship moved from port to port, as she was not allowed to carry women with her, they followed the men across country, so that, especially in time of war, there were thousands of these poor creatures passing through the interior, following, say, ships ordered round from Portsmouth to the Thames. It is notorious that women of ill fame were active agents and allies in the mutiny at the Nore.

By 1824 disorderly women had been excluded from a few of the ships of the Navy, and, strangely enough, as it seemed to some of the old stagers of the time, the men were quite satisfied; certainly they were infinitely better off than before, both in health and pocket. It was a significant and hopeful sign that when they became accustomed to the change they never asked for leave to take women to the ships.

This degrading practice, with its dreadful consequences, was peculiar to the British Navy. "In no foreign service," wrote the surgeon, "can I discover that such a system is tolerated as in ours." The Americans certainly did not sanction the presence of loose women on board their men-of-war. While the evil existed, married people were nominally provided with double berths. It was the custom of the service to give them this accommodation, but when the ship swarmed with women of bad character, the respectable

wife had to take such quarters as she could get. To make things better it was proposed that only well-conducted married women should be allowed on board ; but the day, happily, was not far distant when women were not permitted in ships-of-war except as visitors in the ordinary way. The prohibition banished one of the most deplorable features of the whole shocking and degrading custom—"for the seduction of young women to supply the Navy is immense."

Many women and children were lost with the *Royal George*. A disaster as terrible occurred even so recently as 1857, when the Russian ship-of-the-line *Lefort*, 80 guns, was lost in the Gulf of Finland. Admiral Nordman, who commanded the squadron of which the *Lefort* was a unit, stated in his official report that she was lost on 22nd September. "Suddenly a violent squall laid her on her side," he said. "Though her sails were let go she leaned over so much to port that we expected her masts would go, but she continued gradually to lean over till she foundered in the short time that the *Vladimir* took to tack. The keel of the *Lefort* appeared once, and was then swallowed up in the waves. Exclusive of the commander and 12 officers, the vessel had on board 743 seamen, 53 women, and 17 children. All perished ! A few minutes sufficed for a beautiful ship-of-the-line, thoroughly seaworthy, to be engulfed by the waves during a tempestuous night. Not a cry of distress reached us from the scene of the disaster, although we were but four cables' length to windward."

A famous case of a woman going to sea is that of a young lady of good family, Miss Anna Chamberlayne, who distinguished herself in the action of 30th June

1690, off Beachy Head. She was buried in Chelsea Church, where a Latin inscription recorded her remarkable career. Ninety years later, in Rodney's battle with de Guichen in the West Indies, there was serving in his flagship, the *Sandwich*, a woman who fought a twenty-four-pounder gun, and afterwards attended for a whole night upon the wounded men. These are carefully recorded instances which prove the presence of women on board ships-of-war.

Dealing with the question of women in action, Professor Laughton showed that there was strong presumptive evidence that sometimes they were carried to sea in men-of-war. While there is little doubt that no women were on board the *Victory* at Trafalgar—two years previously Nelson had ordered that they should not go to sea in her—still it happened not infrequently that women were carried in battleships, sometimes openly, but mostly clandestinely. The story was told by Hardy, Nelson's captain at Trafalgar, that Horatia Nelson was born in the sail-room of H.M.S. *Elephant*, in which Nelson hoisted his flag at the bombardment of Copenhagen. Thompson, the sailmaker, was accompanied on board by his wife, who gave birth to the child during battle. This account is contained in *Nelson's Despatches*, but Nicolas gave what he called "complete and irresistible proof" that Hardy was entirely mistaken in his account of Horatia's parentage. Horatia was born on 30th January 1801. She married a clergyman, and died at Pinner, Middlesex, in 1881.

At the Trafalgar period, and for some time before, it was certainly not uncommon for women to go to sea. Sir John Jervis, Earl St. Vincent, in a memorandum

dated 14th January 1796, stated that a number of women had been brought clandestinely from England. They were to be admonished concerning the waste of water and other disorders, and were to be shipped for England, by the first convoy, on the first proof of water being obtained for washing, from the scuttle butt or otherwise, under false pretences, in any ship. The order related to any women in the fleet who had not been admitted under the authority of the Admiralty or the Commander-in-Chief. There is little doubt that some captains, "and probably many captains," did allow women to be on board their ships, in spite of printed instructions forbidding their presence in ships-of-war.

A vivid account, by a contemporary seaman in a line-of-battle ship, is given of the happenings in harbour when she returned home. On reaching Spithead from Trafalgar, as soon as the ship was moored, swarms of boats were around her, some of them bumboats, but a great many "freighted with cargoes of ladies, a sight that was truly gratifying, and a great treat; for our crew, consisting of six hundred and upwards, nearly all young men, had seen but one woman on board for eighteen months . . ." As soon as the boats were allowed to come alongside, the sailors made their choice, and very soon about 450 women were on board. These females always flocked down to the shore as soon as a man-of-war came in, and entered boats that were constantly ready. The boatman, knowing and artful from experience, would take off only the most attractive, because he knew that if they were not allowed on board he would get nothing, whereas he would be paid 3s. each for those who were chosen. A waterman, carrying about thirty

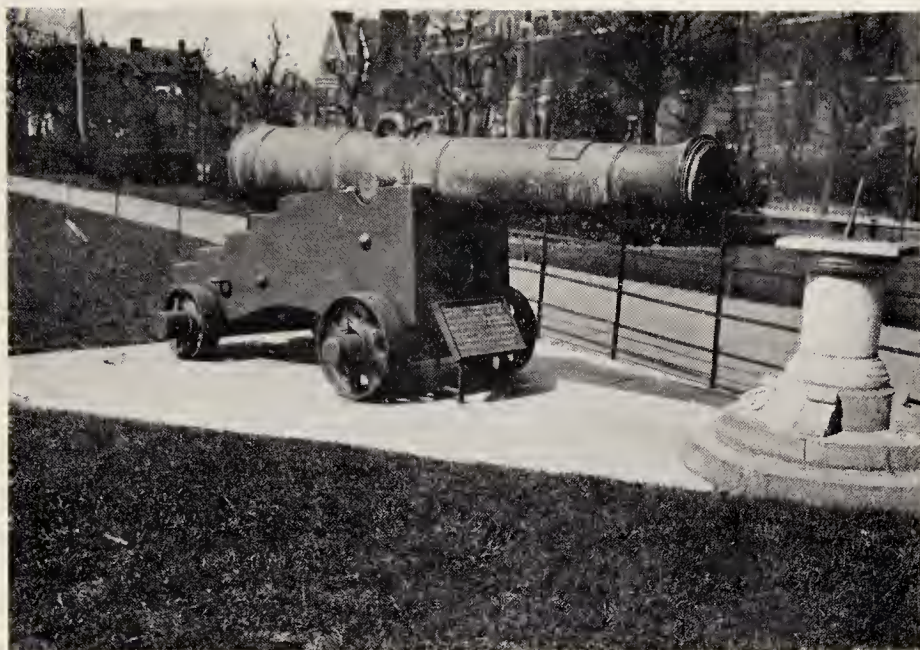
women, in three trips would make nearly £5. This was the state of things at Portsmouth and Plymouth during war-time ; but it related only to the men, who were not allowed to go ashore, although the officers had leave to do so.

Women were on board the *Goliath* at the battle of St. Vincent, and they behaved as well as the men. During the fight they were employed in carrying powder between the magazines and the guns, and, woman-like, they took the news of how the battle went to men who had not the opportunity of learning for themselves, owing to the dense smoke and their own confinement below. One of the gunner's crew of the ship stated that he was much indebted to the gunner's wife, who gave him and her husband a drink of wine occasionally—a welcome attention to men who were parched with battle-thirst. Some of the women were wounded, and one, who came from Leith, died of her injuries. She was buried on a little island in the bay. An Edinburgh woman gave birth to a son during the battle, and one can readily imagine what her mental and bodily sufferings were at such a time.

There are not a few cases on record of officers and men who were actually born at sea in such circumstances as these, and so lately as 1864 there died Admiral John Ayscough, who was born in H.M.S. *Swan*, commanded by his father, while she was in action with the enemy. Occasionally there were more romantic happenings on board ship—when weddings took place. Amongst men who were married in this way was Vice-Admiral George Lostock, the ceremony taking place on board his ship, the *Jupiter*, 50 guns.

In some of the French ships at Trafalgar there were at least a few women, and concerning one of them an old naval officer told that, towards the close of the battle, the French 80-gun ship *Achille*, after surrendering, caught fire on the booms. The survivors of her crew sprang overboard, and, as most of them had stripped, they managed to keep afloat till they could be picked up by neighbouring ships and boats. The *Revenge*, to which the officer belonged, picked up about a hundred of the survivors, many of whom were badly wounded, and all naked. The purser was ordered to issue at once a complete suit of clothes to each man.

On the morning after the battle the officer had charge of the deck, the other officers and crew being at breakfast, when another boatload of the prisoners of war was brought alongside, all, with one exception, naked. The exception was apparently a youth, wearing trousers and an old jacket, with a dingy handkerchief tied round the head. The young person was a woman, and on learning this the officer at once introduced her to his messmates, with whom she breakfasted. He then gave her his cabin, for by that time the bulkhead had been replaced, and with the help of his ditty-bag, which contained such useful articles as needles and thread, and with various contributions, including a pair of the chaplain's shoes, the supposed youth made herself most attractive, and it can be readily believed that she proved "a very interesting young woman." According to the story she told, she was stationed, during the action, in the passage of the fore-magazine, helping to hand the powder, and she was so employed until the ship surrendered. When the firing ceased she made her way



ONE OF THE GUNS OF H.M.S. *ROYAL GEORGE*, RECOVERED FROM THE WRECK.



ONE OF THE TRAFALGAR GUNS OF H.M.S. *VICTORY*, AT GREENWICH HOSPITAL
THE CARRIAGE IS OF LATER DATE.

to the lower-deck and tried to reach the main-deck to find her husband ; but she could not do so, as all the ladders had been either removed or shot away. While in this helpless position the cry of fire was raised, and a dreadful death seemed certain, for the woman was a prisoner in a horrible confined area, which was already filled with smoke and was scorchingly hot with flame.

She was surrounded by the bodies of the dead and the helpless forms of the mangled living, and amongst these ghastly things she ran to and fro distractedly till the guns from the main-deck crashed through the blazing planks above her head. There was only one hope of refuge, and that was the sea ; only one way to the water, and that was through the gunroom port. Frenzied, but active still, she scrambled out of the port, and grasping the rudder-chains reached the back of the rudder. There she remained till the lead which lined the rudder-trunk began to melt and fall upon her. To remain where she was meant certain death, there was little hope of escape even by leaping overboard, but there was, at any rate, a chance, and she took it. Stripping herself, she sprang into the water, and, finding a piece of cork, she kept afloat and struggled away from the burning ship ; then a man who was in the sea got a plank under her arms, and for two hours she was supported by it ; after which a boat of the *Belleisle* rescued her, exhausted and severely burnt. One man stripped off his jacket, another supplied her with a pair of trousers, and a third with a handkerchief, and with this outfit she was covered when she made the acquaintance of the kind-hearted officer of the *Revenge*, who was on watch. He had a canvas screen berth made for her, to hang outside the ward-room door, opposite to where

the sentry was stationed, and he arranged for her to use his cabin as her dressing-room.

For several days the attractive captive harassed herself concerning her husband's whereabouts, then she was thrown into a state of joy upon discovering him, unhurt, amongst the prisoners in the ship. From that moment the position of Jeanette, as she was called, changed, for as her husband could not be admitted to the ward-room, she loyally declined to continue to use her privilege of entering.

When the *Revenge* reached Gibraltar, Jeanette was landed with the rest of the prisoners, receiving from the officers a money present. They parted from her regretfully, and none the less because she was a fine woman of about thirty years, "of the ordinary stature, her countenance was of the Grecian cast, with dark blue eyes, dark eyebrows and eyelashes, an aquiline nose, good set of teeth, and dark brown hair." From a description which was given to him by the officer, Mr. Northcote, an artist of the day, painted a picture of the *Revenge's* handsome prisoner.

There died at Exmouth, in 1865, a woman named Ann Perrian, who was described as a female naval pensioner, and was said to have £10 a year from the Government until she died. She was with her husband in H.M.S. *Crescent* and H.M.S. *Orion* from 1794 to 1798, and shared in the battles of Lorient, Cape St. Vincent, and the Nile, as well as several smaller engagements. In action she was stationed in the magazine with the gunners, preparing flannel cartridge-cases.

When on 16th June 1812 H.M.S. *Swallow* had a hot encounter with two French frigates, there was on

board a seaman named Phelan who had his wife with him. One of the officers of the ship said that she was stationed, as was usual when women were on board in time of battle, to help the surgeon in the care of the wounded. The *Swallow* was engaged with the enemy yard-arm to yard-arm, and consequently the wounded were sent below very fast. Amongst them was a mess-mate of Phelan's, who had received a musket-ball in the side. Mrs. Phelan was consoling their friend, who was at the point of death, when she heard that her husband was wounded on deck. She hurried up and took him in her arms. "He faintly raised his head to kiss her; she burst into a flood of tears, and told him to take courage, 'All would yet be well,' but scarcely pronounced the last syllable when an ill-directed shot took her head off. The poor tar, who was closely wrapped in her arms, opened his eyes once more, then shut them for ever. . . . Phelan and his wife were sewed up in one hammock, and, it is needless to say, buried in one grave." Only three weeks previously Mrs. Phelan had given birth to a boy on board, and on the death of his mother the infant, who was called Tommy, was fed from a Maltese goat which was in the *Swallow*, until Port Mahon was reached.

For more than twenty years after Trafalgar women went to sea in ships-of-war, and at least a few shared in the last of Britain's battles with sailing ships—Navarino. It was the custom, even so recently as eighty years ago, for officers to take their wives and families with them when they sailed from home. When, in 1827, Admiral Sir Edward Codrington left Spithead in H.M.S. *Asia*, as Commander-in-Chief of the Mediterranean Fleet, he

had all his family on board, and this practice was very prevalent. It was, however, soon stopped, and the Admiralty issued an order that captains should not be allowed to take their wives and families on board. The matter seemed settled, but the order was capable of convenient misunderstanding, for captains, while not taking their own wives, worked on an exchange system, and conveyed each other's—doubtless to the satisfaction of many married couples.

Ships-of-war continued to carry women to sea up to the time of the Crimean War, but these were the wives of soldiers who, even as lately as the 'fifties, were allowed, from mistaken notions of kindness and expediency, to accompany their husbands to the scene of the campaign. There are women still living who shared in the sufferings and horrors of the Crimea, and the miseries of herding in transports and ships-of-war at sea, and there are even yet one or two living links, in survivors of the battle of Navarino, with the foul, obscene, but brave and wondrous generations of the sailing line-of-battle ship.

CHAPTER VIII

COMMISSIONING AND FITTING OUT

I HAVE a manuscript which dates from the early 'thirties ; it was compiled by Lieutenant A. D. Fordyce, who was an officer in the Royal Navy, and was afterwards Member of Parliament for Aberdeenshire. The volume, which is in the precise and careful handwriting of the time, gives full details of commissioning ship, and everything relating to her subsequent maintenance and conduct. The ink has faded, and the paper—good, crinkly, handmade material, with an appropriate figure of Britannia as a water-mark—has become a trifle discoloured in places, but the work is excellently in keeping with the easy-going days of sail and stage-coaches. The lieutenant must have spent many patient weeks in preparing his private book, for it contains, in words alone, enough to make a modern novel—and there is infinitely more human interest in it, for the manuscript gives an epitome of the life of a warship and man-o'-war's man of the time when Trafalgar was as fresh in the public memory as the South African War is to-day.

Let us go through this laborious and honest effort together, and see how a British sailing warship was commissioned and kept up. It is worth while to do so, because the method of procedure which had prevailed in the Navy for so many generations was becoming a

thing that has passed. The compiler was dealing solely with the era of sail.

The work begins with commissioning ship, preserving orders, and procuring stores from dockyard ; and it goes into minute detail as to everything relating to the vessel and her crew. There is much that is technically dry, but the lieutenant found opportunity to make quaint observations and to give useful hints from his own experience of naval matters.

The officer appointed to a ship-of-war in commission assembled the warrant officers on the quarter-deck, read his commission to them, and caused the pendant to be hoisted. After this he ought to acquaint the Clerk of the Cheque that he might prepare his books and rigging warrant. The necessary stationery ought then to be procured from the Admiral-Superintendent's office, and the ship's books duly opened ; and as soon afterwards as possible, for the guidance of the ship and officers, the port order-book should be copied. A complete set of circulars were then very necessary, but if that could not be procured, an index of them, with brief notes of their meaning, and any changes from the printed instructions, ought to be noted forthwith in the margin of the book. Fordyce emphatically recorded that a captain should invariably keep a book for inserting all orders received by him from senior officers, as well as all correspondence arising from them, "for without this he never can see his way clear, and is likely to be often in serious scrapes." In the same manner junior officers ought to preserve their orders and correspondence, since an apparently trifling document might become of material consequence in settling serious disputes.

“With all in the dockyard,” he observed, “a judicious and conciliatory spirit tends much to forward the service.” That was when he had gone into detail as to procuring stores from dockyard, rigging ship, and fitting out in dock and in hulk. And the advice seemed needful, for there was incessant irritation to endure. Certain hard-and-fast forms had to be observed in procuring stores by “making a demand”; and the routine had to be observed for every article regularly allowed, “as well as for every one in lieu of another found bad, be it only a thimble.” The first articles that had to be demanded in this way were harbour boats, hammocks, “bedding and present use,” and stores in proportion to the number of people actually on board.

The men were, as soon as possible, to be divided into parties, as follows: Ropemakers, seamen, armourers, carpenters, sailmakers, and painters, and each of these parties were to proceed as speedily as they could with their various branches of work. The ropemakers were to make nettle stuff for rigging, mats, and boarding netting, if wanted, for seizings, for “Rattlings of Rigging,” etc. The duties of the seamen were heavy and varied, beginning with “make mats for the rigging,” and ending with “turn the dead Eyes into Rigging with spun Yarn. Seize on Fore Stay, Bobstay and Bowsprit, Shroud Collars and Bowsprit.”

The armourers were to prepare, amongst other things, “numbers on neat copper plates, for birthing ship’s company’s hammocks; do. for numbering cutlasses by placing on handles. . . . Buttons for buttoning down the hammock-cloths, or copper eyes for lacing them, if that mode be preferred. . . . Iron lever, spread and

flattened at one end, for gunners to work the messenger round the capstan by. Salamanders for firing salutes." (A salamander was the heated iron which was formerly used in firing guns, particularly in salutes, because it ensured regularity.)

The work of the carpenters included fitting and numbering capstan-bars ; fitting mess-tables with drawers for bread, and the messes, in some convenient part, with drawers for tea, sugar, and salt ; with stands for water-breakers below the table ; putting mouldings on the hammock-nettings, ornamenting and trimming the capstan ; "make moulds for anchors and tanks, so as to judge of stowing them without actually getting them on board." Fordyce added as a note :—"The less reeding, grooving, or panelling about carpenter's work in a ship the better, because the dirt and dust speedily collects in them and gives an infinity of trouble to keep clean. The rule ought to be : Plain, neat, and strong."

The sailmakers were to include in their work the fitting of fire-screens ; size and trim hammocks and bags ; survey hammock-cloths and carpenter's tarpaulins ; prepare a sufficiency of draw-buckets ; and cover the chain-plates with canvas ("if there be enough"), so as to be ready for painting.

The duties of the painters were comprehensively given in nineteen words. They were to "number the hammocks and bags ; paint the oars ; look after the 'painting of ship,' as described under that head." When Fordyce reached "that head," he dealt with it in a spirit of becoming gravity ; for those were the days of serious attention to many unimportant and overrated matters in the Navy, chief amongst them being painting.

Before reaching that part of his task, however, he dealt with rigging ship, after she was masted and hauled alongside the hulk. "In placing the rigging *first*," he wrote, "it is doubtless far best to take ample time in fitting, placing, setting well up, stretching and securing; but as times of emergency often occur when it is of the last importance to get all attanto, without a moment's delay, I shall proceed as if under such circumstances; it being easier, I think, to adopt the more hurried to the more leisurely way of proceeding, when wished, than to do the reverse." (The good lieutenant writes "reserve," and generally in the sentence is somewhat obscure.)

Care had to be taken in going into dock for fitting out to let no supply stores be on board, as before quitting dock the ship had to be searched, and it became the duty of the dockyard authorities to prevent anything being carried out of the yard. Inside the dockyard gates the ship was in charge of the master shipwright, to whom application had to be made before anything material could be done on board; outside the dock gates the ship was in charge of the master attendant. It is at this delicate stage that the author alludes to the "judicious and conciliatory spirit."

The hulk was allotted by the master attendant, and it was good to choose it—"if there be a choice"—(dependent, doubtless, on the "judicious and conciliatory spirit")—with reference to the following points: Vicinity to the landing-place in the dockyard; accommodation for fitting rigging and sails out of the wet, and the size of the hulk compared with the number of people requisite to keep her clean. In fine weather the lower deck ought to be washed once a fortnight at least; the

main-deck once or twice a week, according to circumstances. The upper deck was best wetted every evening in summer, otherwise, being without awnings, the sun would do much harm to the deck. It was not of much service to spare the "present-use" brooms on these occasions, in order to add them to the sea-stock. The latter was generally sufficient to last as long as the brooms could be preserved from rotting. Three days at least before reporting ready for sea, the ship's company should be shifted over from the hulk to the ship. It would take fully that time to put things to rights. "Take care, too," added the lieutenant compassionately, "to leave the hulk clear and clean."

In dealing with entering men, Fordyce stated that every man before being entered on the ship's books, whether sent from a rendezvous or not, ought to be examined by the surgeon; then by the boatswain. The following particulars ought then to be noted down for future reference :—

Name.	Years of Age.	Years at Sea.	Statement of Servitude.	Qualifications.
Wm. Guy	32	20	Served five years' apprenticeship in the East County trade in a brig of 160 tons; five years in the North American trade in a bark of 400 tons; and three years in the <i>George</i> bark, of 260 tons, from Liverpool to the Brazils; also two years in the <i>Martine</i> 18-gun brig.	Wages from 12 to 15 dollars per month. Can cut and make a sail. In <i>Martine</i> a foretopman, and rated A.B.

All the men were to be given to understand that they were expected to have sizeable hammocks, a knife, and a marlingspike.

Supposing all the rigging fitted, set up and rattled down, the ends of shrouds squared, capped or pointed, the ends of lanyards pointed or whipped; the ends of all ropes pointed, the gaskets placed on the yards, and mats on lanyards of rigging; guns also on board, Fordyce would proceed to black the rigging, complete stores, provisions and water, and finally to paint. When first blacking rigging he would mix in equal proportions, Stockholm tar, coal-tar (in the same sentence he uses "cole" and "coal"), and salt water, heating them up together in the fish-kettle; afterwards he would diminish by one-half the proportion of Stockholm tar. For yards and braces the coal-tar alone would be used.

The lieutenant considered that the "most commodious method" of blacking rigging was to do so with the topgallant masts on deck, but with royal and topgallant rigging placed at the mastheads. In case of a blow the rigging would not then be interfered with in striking topgallant masts and yards before it was dry.

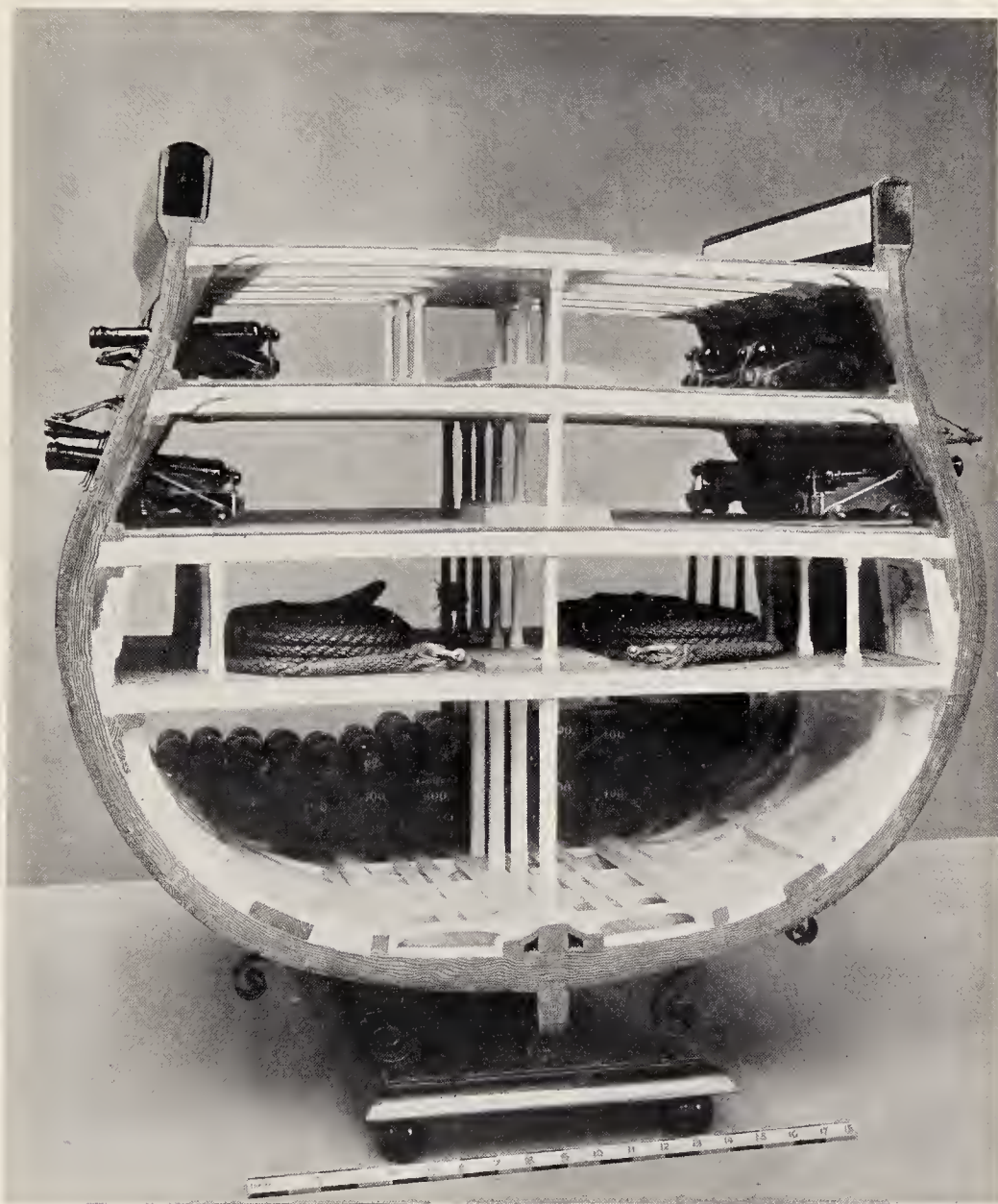
Before beginning operations the decks were to be well sanded, and the paintwork and figurehead carefully covered with old canvas and hammocks. The finer and warmer the day the better, for the blacking would lay on so much the smoother and thinner; but commencement ought not to be made till the "due" was well dried off.

Coal-tar alone, or coal-tar mixed with a little water, was best for guns and shot, "and this ought to be kept very warm while laying on." On a cold day a hot shot might with advantage be put into the guns, to

make them take the blacking better, care being had previously, added Fordyce cautiously, to the unloading of all the guns. The stuff was to be laid on as thin as possible with paint-brushes, using hot salamanders or bolts to keep it warm. If well laid on and wiped afterwards from time to time with an oil-cloth, this would make the guns look well for a length of time. He recommended that a memorandum should be made of the quantity of blacking required for each of these operations. For a 10-gun brig the quantities were : For blacking rigging, 12 gallons ; bends, 2 gallons ; yards, 3 gallons ; guns and shot, 1 gallon. The time required for drying rigging, etc., might be advantageously employed in completing stores, provisions and water.

On receiving an order to complete, the captain instructed the purser, master, and gunner, as well as surgeon, to get their demands ready for the period of time specified in the order. When ready, the captain examined, signed, and transmitted them altogether, if possible, for the admiral or senior officer's approval. A demand for slops, made out by the purser, ought to accompany the demand for provisions.

When there was a victualling establishment the demands of the purser, after being properly approved and addressed, were to be forwarded to the Agent Victualler or contractor. The purser had only to certify that everything was correct—for instance, rum casks full and bread bags of proper weight, and the time they would be ready for embarkation, which he communicated to the commanding officer. The master, surgeon, and gunner also ascertained and regulated with the commanding officer and the dockyard, hospital, and



South Kensington Museum.

MIDSHIP SECTION OF H.M.S. RODNEY, 1833.

ordnance authorities the period of drawing their stores. They were expected to attend in person to see that no mistakes occurred, and to furnish each petty officer as he took a load on board with a list of what was in his boat; the purser doing the same and the officer of the watch noting what was received.

Great care was to be taken to prevent the dry provisions and stores from getting wet. "If, however, some, such as bread, should get wet, lay it out in the sun the first opportunity, separate the bad from the good, and ascertain the extent of damage." The purser was enjoined to ascertain the state of the market when provisions had to be purchased, so as to buy from the most reasonable party, and the master and gunner ought to go through the same routine, all consulting the captain.

Lieutenant Fordyce gave some curious details as to the method of calculating provisions. "The number of men, multiplied by the number of days, will give lbs. of bread; divided by 16 gives cocoa; the half of it gallons of spirits and peas, and the two last added together will give lbs. sugar. Cocoa divided by 4 gives lbs. of tea, or by 7, gallons of vinegar and oatmeal. The lbs. of sugar are 4 lb. pieces of pork divided by 2 and 8 lb. pieces of beef which multiplied by 8 gives lbs. of flour. About one-fourth the proportion of flour is generally demanded in suet or raisins.

Ex. 26·880

6·720

20·160 flour.

3·360 raisins.

1·680 suet—equal to 3·360
flour or raisins.

The momentous task of painting ship is dwelt upon with becoming gravity and detail. When everything that was not wanted had been stowed away, and when there was a clear field of operations, every particle of blacking had to be carefully scraped off, all rents and holes filled with putty, and all woodwork which was not to be painted was to be cleaned and planed. "At first fitting it is prudent to avoid expense in painting, for it is probable that many alterations will be made, and certain that a great deal of blacking will sweat through in the first warm weather. For these reasons stone colour is a handy way of painting at first; it looks well and stands long, and only requires a little sienna and umber in addition to the paint allowed by the dockyard. By deepening the shade in the sills of the ports, the sparchitting piece, the shot-racks and the mouldings of the diamonds, a pleasant vanity may also be given."

Green was doubtless a handsome colour, but expensive; wainscot, the priming of which was fawn colour or light dockyard, was also very handsome, but did not stand well when exposed to the weather. It was adapted to cabins, ward-rooms, gun-rooms, or 'tween-decks, and though expensive at first would in such places as these, if well taken care of, last and look handsome for years. For an upper deck white with a gold moulding was beautiful, and easily touched up, but it did not stand well, especially in small vessels, where the people were more crowded and "work of all sorts interferes more with the paintwork than in large roomy ships. Every dirty finger, every grain of dust, will bear a mark upon pure white, so much so, that

there is no end freshening it up. Vermilion also is a beautiful colour for lids of ports, etc., but it stands only for a very short time, and when it does get shabby looks worse than almost any other colour. It is also more expensive."

Putting on the paint was a serious business; equally momentous was the task of keeping it clean. The best mode of doing this was to let a hand wipe it round every morning with a clean soft rag, such as a piece of old hammock, and fresh water, directly after the decks were washed. When very dirty, however, other means were requisite, and of these Fordyce considered that the best was scrubbing with soap and hot water; but as this might be too expensive for the outside he subjoined a substitute which he took to be the next best. "This is a mixture of wood ashes, vinegar, and fresh water. In the first place the cook is ordered to save the ashes, which are then carefully separated from the cinders; next a quantity of vinegar sufficient to liquidate the ashes is poured over them, while five or six times that quantity of fresh water is added last of all. When well mixed the paintwork is to be scrubbed with it and with canvas rubbers, taking care that it be washed down promptly with plenty of salt water, a mop, and scrub broom. If the washing and rinsing-down be delayed the mixture will speedily dry, be difficult to get off, and turn quite white. If all these methods fail, sand and water, with canvas rubbers, had better be used, but sand as fine as possible."

From painting the lieutenant proceeded to the equally grave question of gilding, the object about to be "guilt," having been previously overlaid with gold size, the best

of which was formed by the oil which floated for a few months on the top of yellow paint.

The gold leaf might be laid on when the coating of size was tolerably dry ; which it would be in the course of seven or eight hours. "Metal leaf," observed Fordyce warningly, "is sometimes passed off in place of gold leaf ; but the fraud may be discovered by dropping on the leaf a little aqua-fortis. This will turn the leaf to a greenish colour if not genuine. Except for figure-heads gilt is not much in character in a ship-of-war. The Service requires something more durable and less tawdry.

"Gilt figureheads are sometimes covered on going to sea, and kept so during the cruise for preservation ; but experience, I believe, has tended to show that the chafe of the cover does more harm than good."

To be ready for sea the ship now only required her running rigging rove and sails bent, both of which operations he describes in detail. The sails being bent and running rigging rove, and being complete with water, fuel, stores, and provisions, "have the exact line of flotation taken and noted in log-book." Guns secured, boats up, in and secured, harness-casks lashed, chests and tables properly cleated, binnacles secured, "vouchers signed and lodged betimes in admiral's office," the mail sent for and carefully deposited, the time came for weighing anchor, Fordyce observing that "The skill of seamen is conspicuous in getting under weigh in difficult circumstances."

CHAPTER IX

AT SEA AND IN HARBOUR

HAVING got his ship to sea, the lieutenant found an opportunity to go back on things generally and to deal exhaustively with trimming sails, making and shortening sail, wearing, tacking, squalls, hurricanes, scudding, and beating to windward, after which he remarks, under the heading, "Martello Tower of Cables or Hawsers": "I have understood that some captain, whose ship was wrecked on the West India Station, constructed a pretty good sort of Martello tower by coiling his cables and hawsers one atop of the other in a large round coil, loopholes being easily left here and there. Into these were put the spirits, ammunition and guns, the officers and marines."

After recording his distrust of the hand-lead, which ought not to be implicitly relied on, Fordyce dealt with boarding at sea, observing wisely that "if the vessel be a foreigner, some one understanding the language should be found, if possible, to interpret."

The crude and imperfect system of naval training even less than a hundred years ago is sufficiently shown by some of the lieutenant's remarks. He says: "The following sketch of a routine of exercise for general

quarters may be useful in bringing things to something like a system :—

- ‘ Man both sides ; marines to great guns.
- Officers muster quarters ; calling over numbers and duties.
- Clear for action and cast loose.
- First lieutenant or captain, exercise 4 rounds.
- Captains of guns, exercise 4 rounds.
- Second captains ,, ,,
- Man one side ; marines to small arms.
- First lieutenant and captain, exercise 4 rounds.
- Second captains, exercise 4 rounds.
- First captains ,, ,,
- Shift a gun from side to side, or from forward to aft.
- 1st part 1st Division of boarders on starboard quarter and larboard ;
watch of marines to protect them.
- 1st part of 2nd Division of boarders on starboard bow, and starboard
watch of marines to protect them.
- Muster 1st part of 2nd Division of boarders on starboard bow, and
captain of guns exercise 2 rounds.
- 2nd part of 1st Division of boarders on mainyard, starboard side.
- 2nd part 2nd Division of boarders on foreyard, starboard side.
- 1st Division of firemen to larboard main chains.
- 2nd ,, in boatswain’s storeroom.
- Stand to guns on one side, marines aft.
- 1st Division of sail trimmers to main topgallant clewlines.
- 2nd ,, ,, ,, to fore ,, ,,
- Take in the sails, then to quarters.
- Shift breechings, flints, trigger-lines, and trucks.
- Riggers secure main mast, supposing all the shrouds on one side
carried away, or
- Second foremast, supposing the bowsprit gone.
- Man the boats, the crews being all armed.
- Man both sides.
- Examine arms.
- Secure guns.
- Routine of exercise for one division or one gun.
- Stand to guns, as manning both sides.
- Call over numbers and duties.

Clear for action and cast loose.

Officer, exercise 4 rounds, as both sides	} being particular in pointing.
1st captain, exercise 4 rounds, as both sides	
2nd " " " "	

Stand to guns as manning one side.

Officer, exercise 4 rounds	} being particular in pointing.
2nd captain, exercise 4 rounds	
1st " " "	

Shift breechings, flints, trigger-lines, and trucks.

Mount, dismount, and transport a gun.

The men to be examined concerning the following points :—

Applying the match.

Entering the cartridge and telling when it is home.

Using the sight and taking aim.

"	swab.
"	apron.
"	sponge.
"	rammer.
"	worm.

Loading with round and grape.

Cleaning the vent when choked.

Wetting the guns when hot.

Extent of trim, in point.

Extent of different ranges, in cables' length.

Stand to guns, as manning both sides, and secure.'

"Laying out an exercising with shot at a target in harbour :—Prepare an empty provision cask as a target, by driving an oar or some handy spar through the bung-hole, so that one-half may be above and the other half below the cask ; three 18 lb. shot, slung to the under half of this, will keep it upright when in the water, and an old hammock, spritted well out, will make a good flag.

"The bung-hole must be well secured, so as to admit water ('not' is obviously omitted in the manuscript).

"If it be wished to make the target movable send a boat with a long line to tow ; but if it is to be stationary

make fast a grappling with sufficient length of rope to the cask to anchor it abreast the guns. A buoy and buoy-rope ought also to be attached to the grappling of sufficient strength to weigh it and sufficient length to take the buoy out of the line of fire. This is for the purpose of picking up the grappling in case the cask is destroyed by the shot.

“The best exercise by far is at sea under sail—the same sort of target as in harbour. The sail-trimmers then have to trim the sails, the captains of guns to judge of the various distances, adjusting the sights accordingly, and looking out for the roll of the ship.

“For the small-arm men a target may easily be composed of an iron hoop and piece of old canvas; this seized to a pump-spear, and that again to the end of the studding sail boom or foreyard, is all that is requisite, except when ready to rig out the boom.

“At times it may be more convenient to have it seized on to one of the swinging booms—hauled forward and stopped up.

“After exercise the marines and small-arm men should be excused from other duty to clean their arms; if disturbed in this, screws will be lost or misplaced.”

In dealing with ranges, Fordyce says it would be found useful to have a scale similar to the following of the ranges of the guns:—

Ranges of an 18-pounder carronade—

Point-blank	.	230 yards.	3 degrees	.	790 yards.
$\frac{1}{2}$ degree	.	330 "	$3\frac{1}{2}$ "	.	840 "
1 "	.	430 "	4 "	.	890 "
$1\frac{1}{2}$ "	.	530 "	$4\frac{1}{2}$ "	.	940 "
2 "	.	630 "	5 "	.	990 "
$2\frac{1}{2}$ "	.	710 "	$5\frac{1}{2}$ "	.	1040 "

Range of a long 6-pounder—

Point-blank	.	300 yards.		2 degrees	.	1000 yards.
$\frac{1}{2}$ degree	.	500 "		$2\frac{1}{2}$ "	.	1140 "
1 "	.	700 "		3 "	.	1280 "
$1\frac{1}{2}$ "	.	850 "		4 "	.	1540 "

Progression range of carronades from the point-blank :—

From the point-blank to the 1st degree, each $\frac{1}{4}$ degree, 100 yds.

" 1st degree to the 2nd, each $\frac{1}{4}$ degree, 75 yards.

" 2nd " " 3rd " " 70 "

" 3rd " " 4th " " 65 "

At this point the lieutenant gives the following minutes of inspection of a line-of-battle ship, as being useful for reference :—

h.	m.	s.	
10			Manned yards.
	15		Admiral came on board.
	15	30	Piped down.
	17	30	Beat to quarters.
	20	40	Cleared for action.
	26	40	Reported ready.
	30	10	Admiral inspected upper-deck quarters.
	42	15	1st, 2nd, and 3rd Division of boarders and 1st and 2nd Divisions of pikemen called.
	43	30	Reported ready.
	45	20	Admiral inspected main-deck quarters.
11			Exercised main-deck quarters.
	10	40	Shifted breechings of main-deck guns.
	11	20	Rove new.
	12	40	Dismounted main-deck gun, larbd. side and transported aft.
	17	42	Secured.
	20	30	Firemen called.
	20	50	General fire.
	26	50	Returned to quarters.

h.	m.	s.	
	30		Dismounted and transported two guns on main-deck, one supposed to have burst.
	38	30	Ship would not wear.
	39		Cut away the mizen-mast.
	39	40	Starboard quarters to clear wreck.
	40	35	Returned to quarters.
	43	30	A racking (? raking) shot took away starboard fore rigging.
	44	50	Wore ship.
	44	52	Whole of main rigging gone.
	45	30	Got hawser into main-top.
	50	10	Fore rigging secured.
	53	40	Admiral inspected lower-deck quarters.
12			Secured main rigging.
	5	40	Secured the two main-deck guns in their respective carriages.
	7	30	Bowsprit carried away.
	10	30	Manned both sides of each deck at quarters.
	15	40	Upper-deck guns reported secured.
	15	42	Main-deck guns ,, ,,
	16	30	Lower-deck guns ,, ,,
	17	45	Returned stores.
	29	30	Beat the retreat.

In preparing for action the first thing to be done was to get the hammocks and stow them, then the proceedings were: "Hinge up or take down all bulkheads or hanging canvas on all the decks; put down from the gun-decks all trunks, chairs, and tables, and everything else not absolutely necessary for working the guns or sails; put tarpaulins over the hatchways, and wet and prepare magazine passages. Place match tubs with water in them and matches; fill the store-casks with water on the gun-decks. Have spare tiller and relieving tackles ready; topsail sheets stoppered, lower yards slung, and if settled weather topsail yards also, preventer

braces ready for lower yards and topsail yards, runner and tackles, etc., and single tackles ready for masts. Add several preventer stays to lower masts, stopper, stays, and backstays to each other, and put in practice any other device by which one part of the standing rigging may become a substitute for another.

“Prepare platforms in the cable tiers for the sick and wounded.

“Have both the cockpits clear and well lighted, as well as the whole orlop-deck.

“Let the carpenter see that the wings are clear, his boards, plugs, and tools in readiness; as also the slings for sending his crew to work outside the ship.

“Wet and sand the decks, and if dry weather wet the lower parts of courses.

“Put out the galley fire and light the light-rooms.

“Beat to quarters; cast loose the guns, and have a good supply of shot at hand.

“Proportion your sail so as to have as much as will enable your ship to sail a little faster than the enemy can do with the sail under which he seems inclined to engage.

“If you wish to check the ship’s way, do it as much as possible with the helm and by slacking the lee-braces.

“The custom of laying-to during battle has almost entirely ceased, from the manifest disadvantages of being not under command of the helm.”

In dealing with the comparative view of different positions in action, Fordyce records that the advantage of engaging to windward was that it gave the choice of situation and distance and power of suddenly changing the side engaged; the disadvantages were the difficulty

of pointing and running in the guns for loading ; the danger of opening lower-deck ports ; the exposure of men on the upper deck to small-arms fire and inability to return it from aloft, through the intervening of the sails. The disadvantages of engaging to leeward were inability to choose situation or distance, and the probability of receiving shot "underneath the low water line."

The most destructive positions were the weather quarter and the lee bow, because the fire was in some measure raking, and masts, yards and rigging more exposed even if right ahead than astern ; add to this that neither could alter their course without tacking or bearing away, "thereby exposing themselves to much hazard."

The accidents of most common occurrence in action, with their preventatives, were given under five heads :—

1. Shipping large quantities of water by lower-deck ports, so as either to sink the ship or render it difficult to continue the action. To prevent this, extreme caution should be used in the number of lower-deck ports opened at one time.

2. Wounding men by the recoil of overheated guns as well as by their flying fore and aft from the recoil acting unequally on the breeching. Exercise in quick firing would go a long way to prevent this, coupled with a judicious use of a reduced charge of powder.

3. The bursting of guns. Guns had most frequently burst by being with the muzzle in the water, or by having one loading of powder and shot put over another ; by having an immoderate quantity of different kinds of shot put over the powder ; and particularly and most frequently by having iron crows, bolts, pieces of iron, or

loose langridge put over the round shot, which acted as wedges to them. To prevent these the strictest attention of captain and officers was required.

4. Partial explosions of powder on the gun-decks. The safest place for spare ammunition and powder then was on the disengaged side or middle of the deck. No undue quantity ought to be accumulated, and wet swabs should frequently be used to drown all powder that was spilt.

5. The breaking of the breechings or the ironwork to which they were secured. Spare breechings ought to be at hand and the men frequently exercised at shifting them. The ironwork ought to be constantly looked after, and if bad, shifted at every opportunity.

A turning aside is made from the grim question of fighting to the more attractive matter of going into harbour, stress being again laid on the importance of scrubbing the paintwork outside and freshening it, if possible, where most wanted. To shorten a press of sail quietly, smartly, and well going into harbour, and at the same time pick up a proper berth, was a manœuvre requiring pre-eminent skill and discipline. None but a ship in the best order was seen to come into harbour after a cruise and look as neat about the rigging and fresh about the hull in half an hour or so as if she had been in harbour for a month.

Saluting was as important as painting. There were two important points in saluting which were undetermined—1. the interval necessary between each two guns; 2. the proper moment for firing the salute in going into harbour and joining and rejoining the admiral and meeting him at sea. "True," writes Fordyce, "it

is vaguely said in answer to the last that the proper moment is that in which the flag is first discovered ; but by adhering to this rule the salute frequently fails of being noticed. As far as my own observation goes, I have remarked, with respect to the first point, that an interval of five seconds is generally liked, and with regard to the second point that the best effect in coming into harbour and saluting is produced by firing the salute the moment before shortening sail, so that while the smoke is still curling around, the ship is seen steadily shortening sail and picking up her berth. The salute then cannot escape the notice of all the vessels assembled in the roadstead ; the respect paid your own chief is visible to every eye, and if the whole is well done it is a proud manœuvre. The same applies at sea. When the admiral or senior officer gives an order for saluting, inquire whether he intends to dress ship, that you may be prepared to follow his motions."

An hour's warning ought, if possible, to be given to the gunner, so that the salamanders might be prepared and the guns drawn and reloaded to prevent accidents with shot. If in harbour all boats should be dropped astern, the shock being apt to injure them. Warning also should be given to the master, so that the time-keepers might be properly attended to. In carronades the cartridge was very apt to slue the wrong way in ramming home. To prevent this, great care was required on the part of the loader in pushing the cartridge steadily home before hitting the final blows—"your salute otherwise may be vexatiously spoiled. Be sure the colours are up."

Unbending sails and stripping are dealt with, then refitting. On going into harbour the captain took a

list of defects to the admiral or senior officer, who forthwith ordered a survey, which, having been held, demands were forwarded as soon as possible to the admiral for approval. After holding the survey, demands had to be made out for rigging and stores in lieu of what was condemned. Fourteen days were needed for generally overhauling and refitting; two days for provisioning and completing stores; one day for watering; five for painting (if general)—twenty-two days in all, and three Sundays added to these made a total of twenty-five.

The dockyard rule for ballasting a ship was to divide the number of tons by eight and the quotient by five; the difference between the quotients was the weight of ballast in tons. This quantity had to be taken on board, unless some satisfactory reason could be alleged to the contrary. A shorter though rather rougher way of calculating the weight of ballast was to cut off the last figure of the ship's tonnage. If pigs of ballast had to be moved about on shore, something in the shape of a handbarrow ought to be used for the purpose. Weighing the ballast tended to make a ship roll; building it up amidships to keep her steady. "Without venturing on details, the plan of keeping the ballast in the body of the vessel and clear of the extremities seems most generally approved of."

There were various sorts of tanks, but the following were in most general use:—

Whole tanks, 4 ft. square, containing 2 tons = 475 gallons.

Half tanks, 3 ft. 2 in. square, containing 1 ton = $237\frac{1}{2}$ gallons.

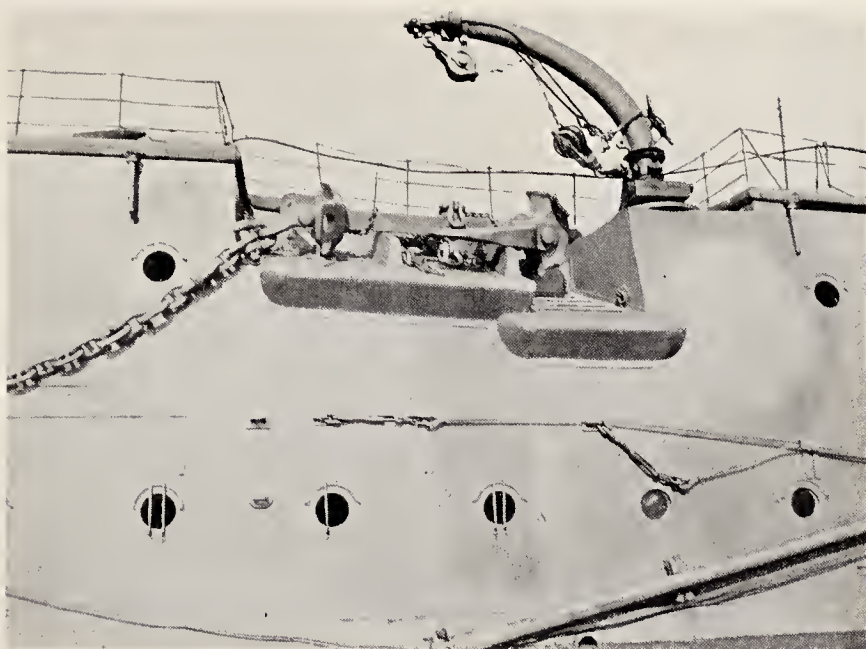
Bilge tanks, 3 ft. 2 in. broad, 2 ft. 5 in. deep = $132\frac{3}{4}$ gallons.

Quarter tanks, 3 ft. 2 in. broad, 1 ft. 7 in. deep = $118\frac{3}{4}$ gallons.

In getting tanks from store it was necessary to see that the lid-sockets were properly lined with fear-nought, otherwise, in rolling, much of the water escaped ; it was essential also to see that the proper number of keys were obtained, and that they were not too long to work between the deck and tanks. Whitewashing tanks inside was found to be useful in keeping the water in them pure. The screws for letting off the water required very careful treatment. They were apt, if over-started, never to be so tight again, and after being a long time (three or four years) in use, the nuts decayed and made the keys useless. If the water could not be turned off from the tanks by the proper mode there seemed no other way of getting rid of it, in case of necessity, but by knocking a hole with a crow-bar in the bottom of the tanks.

As there were no regulations as to the size of mid-shipmen's chests, it was suggested that these should be settled by an Admiralty Order, a "snug and judicious size" being given, as : Length, 3 feet 6 inches ; breadth, 1 foot 10 inches ; height, 1 foot 10 inches.

In writing of making alterations from the establishment the lieutenant waxes wrathful. "Those officers who have an incessant itch to make alterations from what is fixed and allowed by the establishment would do well first of all to pause and reflect on the following circumstances." He then goes into technical detail, and adds, "What a beauty there is in the uniformity resulting from established proportions ; what a satisfaction in keeping the ship's accounts clear and her resources available, not to mention the pleasure of being free from the worrying feeling about alterations



AN ANCHOR-BED OF H M.S. *REVENGE*.



ONE OF THE *VICTORY*'S ANCHORS, CARRIED AT TRAFALGAR.
Near the spot at Southsea, where this relic is placed, Nelson embarked for the last time.

whose immediate benefit few, perhaps, can see, and whose consequence and end none can foretell."

When a man-of-war went out of harbour before the hour of hoisting the ensign, it was always etiquette to hoist the ensign when she was aweigh, hauling it down half an hour before eight. "But if it is a vessel whom you have been long in company with—one of the squadron, for instance, setting out on some enterprise or quitting a foreign station to go home, it is usual to add three cheers. For this purpose, as she passes, or as she hoists her jibs and braces round her head-yards, man the rigging on the nearest side, hats in hand and faces turned to the object; let the boatswain regulate the time of each *hurra* by his pipe, ceasing at the end of the third. The vessel thus saluted ought to return it in the same manner, and, to close all, the first ought to give 'one cheer more' and pipe down. If it be a single person in a boat that is cheered, he and his boat's crew ought to stand up and return the three cheers; and if any of these be transacted after dark, a blue light in each channel, lit when the cheering commences, makes a vast improvement in effect. Two ships parting company at sea dip their ensigns to each other."

In dealing with bathing, Fordyce said that in a large ship, with plenty of boats, there was no reason why the men should not go over on both sides. More than ten minutes, and swimming, in the water was not beneficial. If there were men who wished to bathe, but could not swim, or if there were any chance of sharks, a sail, such as a lower studding sail, ought to be got overboard with the inner halyards rove

through a port forward, and the sheet through another aft, the outer leeches being hauled out by whips from the lower yard arms. Tricks should be discouraged, "for it has happened that people who could not swim have been frightened into fits by letting go the rope they were hanging on by."

A line-of-battle ship's lower deck might be kept perfectly clean by dry holystoning once a day, after every meal, giving every spot of dirt a touch of the stone, and sweeping the berths out, as well as sweeping clean forward and aft, before and after every meal; adding once a week a clean sweep with every chest and obstruction off the deck, and wet holystoning only after any particular duty and extra work, such as provisioning or cleaning the holds.

Desertion was common, the most frequent deserters being the men who had been but a short time on board and had only little wages due. A common way of dealing with the evil was to see that all those who were allowed to go on shore first returned on board before any other men could be given leave.

There was plenty of smuggling, too, much of which was checked by quietly putting contraband liquor into a keg in the spirit-room, and reserving it for such occasions as splicing the main-brace and mixing it with paint for drying, etc. A sharper method of dealing with a plus of grog was to start it overboard, and this was often the first order to the mate of the tub and the purser's steward, so that it became the interest of no one to mix more than the precise quantity. If dealt with in a more ceremonious manner, the purser was likely to be defrauded on the one

hand and drunkenness and irregularity to ensue on the other.

Cocoa and meat were served out daily, the rest of the provisions as follows:—

Monday—Bread, tea, sugar, flour, and a dip to each mess.

Tuesday—Peas.

Wednesday—Bread, flour, and a dip to each mess.

Thursday—Peas.

Friday—Bread, tea, sugar, flour, and a dip to each mess.

Saturday—Peas.

Sunday—Flour.

The peas and meat were given to the cook as soon as his coppers were clean; all the other provisions were to be served out after dinner, beginning in time to allow of finishing before the decks were cleared up. The word was passed by a boatswain's mate when ready, a petty officer attending to see that justice was done. The hands, if possible, were not to be turned up, and then, if the messes did not come for their provisions in a reasonable time they should forfeit them, unless some valid excuse could be made. Rules of this sort were necessary to preserve regularity.

Casks of beef contained 38 pieces of 8 lb. each; casks of pork 52 pieces of 4 lb. each. The daily allowance of a man was $\frac{3}{4}$ lb., so that in cutting up, for serving out, the object was to cut the meat into 3-lb. pieces, which was the ration for four men; half of the allowance was for two men, and a quarter of it the quantity for one man. Consequently a cask of beef would make 101 and a cask of pork 69. On choice pieces of salt meat the charges were very

arbitrary ; on those of fresh meat it was usual to charge one pound extra on every seven, and one pound on five, if for rounds. If any dispute arose with the officers, the best way to stop it was considered to be to let them take a cask up for themselves.

Biscuit was sifted before serving out, and this annulled all after claim for compensation for bread-dust ; but if the bread was not sifted, it was customary for the purser to allow half the weight of bread for the weight of dust returned to him. In serving out a bag of bread to each mess, more dust than usual was inevitably made, and on such occasions it was considered but fair to allow an equal weight of biscuit for the weight of dust returned.

If biscuit was started out of the bags and stowed in bulk for the purpose of saving room, the result was that, though a little stowage might be gained, the biscuit bred vermin, accumulated filth, and caused much loss to the men in comfort and to the purser in dust ; it was also next to impossible to make the men working amongst it always spread a cloth under their feet. In perfectly smooth water a 25-foot cutter would carry twenty bags of bread.

Water was a precious commodity on board ship even eighty years ago, and the daily allowance was left to the discretion of the captain. The usual quantity, however, was a gallon, and the following table was given as "a pretty strict example" of the mode of serving out water in a 42-gun frigate, that for a ship-of-the-line being in proportion. The water was measured out with the imperial measure, every officer having an imperial gallon, every man three quarts ; the

account in gallons being balanced every day in the log-book. The allowances totalled 257 gallons, and included :—

	Gals.
Captain's mess, including an admiral and 3 women	10
Gun-room	14
Larboard berth of midshipmen	14
Stock	7
Warrant officers	3
Ship's company	173
Sick	2
Boiling away	10

No extra water was given to the officers for washing, but each of their servants had a pint served out for that purpose by the gun-room steward when the water was taken below. The frigate which is given as an example stowed 103 tons of water, which lasted eleven weeks and six days. If the water was found to lap over the lids much, it was best to take a little out of each of the first few days' allowance.

The usual daily allowance for a sheep was a pint of water.

Coaling in the 'thirties was a primitive and simple matter compared with the same operation to-day. It was particularly essential that the time of taking in coals should be arranged so as to steer clear of the time of painting. If coals were to be got on board in bulk in a ship's own boats—a thing which ought, if possible, to be avoided—tarpaulins should be sent to protect the paintwork and prevent the dirt from collecting in the boats, and the sills of the ports, the deck, and the square of the hatchways should be protected as much as possible in getting them on board. It was to the interest of the purser to supply large canvas bags, or

to make large tubs out of empty casks ; if these things were not available, then the boatswain's buckets had to be used, at the risk of great waste and the expense of much time. The coal-hole was to be carefully levelled in stowing away. In perfectly smooth water a 15-foot jolly boat would carry three-quarters of a ton of coal in bulk, a 25-foot cutter barely two tons.

Hen-coops were important features of a ship-of-the-line, and much care was bestowed upon their preservation. It was essential that in fitting the coops there should be drawers underneath the batten flooring, to draw out and clean easily every time the decks were washed. The banisters were to be sufficiently close to prevent the chickens from getting out, and there were to be tarpaulin curtains, furled by day in fine weather and let down at night or in cold or bad weather. There were also partitions to separate large fowls from small, the sick from the healthy, and turkeys and ducks from fowls, because none of these creatures agreed together.

The simple devices which had been in use almost since the Royal Navy started were employed in connection with cabins and gun-rooms and their furniture. A drawer in a table was justly regarded as a useful thing ; yet the dockyard did not supply it. For keeping dishes upright, especially those that contained gravy, when the ship was heeling over, broad wedges of different sizes, covered with baize, were considered capital things. "Puddings," too, or long round bags, made of canvas or baize, and stuffed with peas, were indispensable in a seaway for keeping dinner things on the table. These had a becket and lanyard at each end, and were put on lengthways, being set up to the legs

of the table by the lanyards. For keeping wine decanters and glasses on the table in a seaway, a fiddle was essential. This was composed of four pieces of flat wood as bridges, with the holes through which were rove four or six strings made of white line as long as the table, their ends being all seized together and set up by a lanyard to a small staple placed for the purpose under the table at each end.

In dealing with caulking, Fordyce records that when caulkers were in gangs they always slashed away in such a careless style that they very much spoiled the appearance of the deck by widening the seams and splintering their sides. It was therefore a preferable plan always, where possible, to keep the caulking attentively minded by a ship's own caulkers; the small, narrow straight seam which formed so great a beauty of the deck would then be much longer preserved.

The galley fire, reminiscent of the distant days of sail, was lighted at an early hour. If the coppers were started at 4 a.m., there was time enough to have the cocoa perfectly made by a quarter past seven; and if the range was lighted at six, there was plenty of time for preparing the officers' breakfast at eight. Dinner being generally piped to at noon should be ready at half past eleven, at which time the fire should be transferred from the coppers to the range till noon. The warrant officers and midshipmen having had the privilege of the range till that hour, it was given up to the captain's and gun-room cooks. When the warrant officers and midshipmen had had their tea, which generally happened at four o'clock, there was supposed to be no occasion for any one to have access to the range except the captain's and

gun-room cooks ; and after their tea was over all fires, except perhaps the stove, might be dispensed with. No fire should be kept in after eight, except with the captain's express permission, which circumstance was to be notified to the officer of the watch.

The Admiralty regulation for smoking was in the galley during meal-times ; but in a single-decked vessel this became a nuisance. It was considered much better to allow smoking on the forecastle ; one side for the men, the other for the warrant officers, and that pipes should not be allowed without covers.

Rough methods still prevailed of calculating weights relating to sailing warships. A hundredweight for a gun was a rough rule for ascertaining the weight of a ship-of-war's anchor—for example, 74 cwt. for a 74-gun ship. It was generally supposed that the weight of a ship was nearly four-fifths of her tonnage by admeasurement. The cube root of the weight of a mast was nearly the weight of its standing rigging. To know how much the guns would lighten a ship, divide the tonnage of a first-rate by 10 ; the quotient would nearly give the weight of all her guns. Divide by 12 for two-deckers, and by 14 for all others. The carriages would weigh about one-sixth of their respective guns. The weight of an 80-gun ship, when fitted for Channel service, was thus :—

	Tons.
Hull	1593
Masts, yards, studding sail booms	65
Other furniture	130
Guns, carriages, and ammunition	232
Provisions and casks	800
Weight of men and ballast	731

3551
equal to the displacement.

Admiral Stirling's rule for measuring tonnage was to multiply the length of the keel by the extreme breadth, and the product by half the breadth, and then divide by 94. Another rule was the difference between the light and load watermark; for instance, the weight of the *Vanguard*, 74, was—

					Tons.
Light watermark	.	.	.	.	1632
Load	„	.	.	.	2273
Real burden.	.	.	.	.	1141
Tonnage by common rules	.	.	.	.	1604
Difference	.	.	.	.	463

In assigning the depth of a hold for a man-of-war, it was usual to make it equal to half the breadth of beam.

There had been vast improvements in the Navy by the early 'thirties, but it was still considered unnecessary to do more than teach seamen the simplest and most elementary drill. The platoon exercise, with fixing and unfixing bayonets, seemed all, or nearly all, of small-arms exercise that bluejackets required to be taught, or were at all willing to learn. The following was the manual of small-arms exercise :—

Prime and load.	Ram down cartridge.
Handle cartridge.	Return ramrods.
Prime.	Make ready.
Bout.	Present.
Draw ramrods.	Fire.

CHAPTER X

CHANGE AND DECAY

WHILE battleships were being designed but never built, and constructed but left unfinished, great and noble wooden walls were changing into clumsy steamers, while others were decaying in creeks and harbours or being broken up; for the reign of steam and armour had begun.

From generation to generation, century after century, there had been nothing on the waters but sailers; now, with startling suddenness, there were created vessels which, to established ways of thinking, were abortions and abominations. To-day we progress so swiftly that we are scarcely thrilled by any new discovery, and emotion is replaced by boredom. The *Dreadnought* of six years ago is hardly capable of causing passing interest, and her super-sister is accepted as a thing of course.

Far different were affairs while many of the veterans who had served with Howe and Nelson were alive. Quick suspicion was succeeded by profound distrust, and men were startled at the thought of being burdened by such heavy sums as were essential to provide even one steam warship that was fit to take her station in the line-of-battle.

Prison-ships, hulks, hospitals, barracks—these were some uses to which old warships were degraded when it was acknowledged that the day of oak and canvas had departed. Yet many sailing battleships were still afloat, flying the flag in all parts of the world, and forming a link with the old navy of blood and tears and the new fleet of safer things and fairer laws. Beef and beer, pigtails and Pollies, hangman's ropes and cats-o'-nine-tails — these, with carronades, smooth-bore muzzle-loaders, pikes and pistols, were vanishing with the worn-out half-pay officers who had done so much for England and received so little for it.

The 'thirties were a momentous period in the history of battleships, for mechanical propulsion had been successfully established. It was a time of far-reaching reform at sea as well as on land, a period of unexampled change and decay in wooden ships. The might and glory of the old ship-of-the-line had passed, and the sun of triumph of the wooden walls had set at Navarino. The sailing battleship had reached the summit of her pomp and power, and it will be interesting and instructive to see what she had become and what the conditions prevailing in the Navy were. Great improvements had been made, yet there were in existence many of the drawbacks and discomforts which were inseparable from sail.

The large crews carried by ships-of-the-line were needed mostly to work the guns, though a considerable number of men were essential for the handling of the immense sails and spars. In line-of-battle ships the crews, generally speaking, were far better off than those of smaller craft, for although there were greater numbers

of men to carry, still there was much more and better accommodation proportionately, than in frigates and lesser vessels. At one period it was not unusual to divide the working force of a warship into three watches, although the general custom was to have two, to work the ship alternately. Into these two watches were divided the seamen and embarked marines, each watch performing alternately, during four hours, the sailing operations of the ship. Each party had four hours' duty and four hours' rest, or four hours on deck and four below, with the exception of the four hours between four and eight o'clock in the afternoon, which were divided into two half, or dog watches. The effect of this break was to give a constant alteration to each watch's periods of work and rest; so that the men who had the first watch one night had the second the next night, and so until the circuit was completed. It followed that sleep was greatly disturbed, and much sickness resulted from the sudden change to a bitterly cold deck, especially at midnight and 4 a.m., from the stifling warmth of the sleeping quarters. The three-watch system gave the men longer continuous periods of rest, though the party in charge of the ship was necessarily much reduced. These lessened complements were at times a source of danger, and greatly added to the work which had to be done by the watch on deck. When a ship was in port, the number of men kept on deck was very much reduced, and in vessels in secure harbour all hands, excepting the officer, petty officers, and sentries in charge, might spend the whole night in bed.

In all ships under first-rates seamen and marines were berthed on the lower deck; but in first-rates they



A LINK WITH THE PAST.

were berthed on the middle as well as the lower deck. In frigates and all smaller vessels the lower deck meant the lowest, or that which covered the hold and store-rooms ; but in ships-of-the-line it meant the lower gun-deck and had the orlop-deck between it and the holds. Consequently there was a great difference between the accommodation in a ship-of-the-line and the parts of the vessel in which people lived in frigates and smaller craft.

Ships-of-the-line had ports, which could be kept open in calm and moderate weather ; but in the frigates, etc., there were only scuttles, small apertures so close to the water that they could not remain open except in perfectly calm weather at sea, or very fine weather even when in harbour. Ships-of-the-line also had more means of ventilation, and as a rule were better ventilated than smaller ships, largely because of the intervention of a deck between the crew and the hold. Overcrowding was inevitable in ships of all classes, owing to the limited accommodation for eating, drinking, sleeping, and all domestic purposes.

The usual space between the clews, or suspending points, of the hammocks was from 14 inches to 18 inches, so that when the hammocks were extended by the beds the men's bodies were in contact. When a ship was at sea, with a watch on deck, there was a reduction of half in the pressure and accumulation, but in safe harbours 500 men or more would sleep on one deck, their bodies touching each other, over the whole space laterally, and with very little room to spare lengthwise.

Until the forties, artificial ventilation was effected on board ship almost entirely by windsails ; and that method had many essential defects. In dry weather,

with strong breezes, enough pure air could be carried by the windsails to the decks; but could not be sufficiently diffused. They could reach only one point of one deck at a time, and in fresh breezes that point was so strong and chilling that it often caused illness amongst the men on whom the draught immediately fell. Sometimes the men near the windsails would stealthily tie them up during the night, and so, perhaps for a whole watch, rob their messmates of the fresh air which the windsails supplied, and which was particularly wanted by the men whose hammocks were slung at some distance from the hatches. Windsails, which were taken up during rain, were often not let down again when the rain ceased, owing to negligence; and consequently the decks were deprived of the air supplied by this method.

It was usual to employ three windsails, which were suspended from the rigging, passed down the hatchways, and ended at any point between decks which might most need ventilation. The windsails varied in size from 18 inches to 3 feet in diameter. Their great drawback was their inability to diffuse the air equally, for, in some cases, where the tubes ended, there was too much, and in other places either little or none. In calms the windsails were useless, and in rainy weather they failed because they could not be advantageously employed. It was found that in small ships the ventilation was assisted by the cooking apparatus, when it was on the same deck as that on which the crew were berthed, because the heat of the fire, especially in cold weather, contributed to the circulation of the air. In the early forties, Captain Warrington introduced an apparatus which cleared a ship of foul air and replaced it with pure

air, and that appliance heralded the intricate system of ventilating the battleships of to-day.

When ships-of-the-line had reached their highest development personal cleanliness was rigidly enforced. At least twice a week the men's shirts, frocks, and duck trousers were washed or scrubbed and changed. In fine weather there was frequent bathing, and regular washing of the body, and shaving, combing, etc., were required. Special care was given to the cooking utensils and the hammocks. These were scrubbed clean at regular and frequent periods, and though the hammocks were generally stowed in the bulwark nettings during the day, yet in fine weather they were opened, and beds and bedding were exposed to the purifying influence of sunshine and fresh air.

The health of the Navy and its comfort and content were greater in the period of the change from sail to steam than they had ever been since the Navy was established. Mind as well as body received the closest care, and measures were taken to give the men instruction and entertainment. In August 1838 an Admiralty Order directed that libraries should be established in each of Her Majesty's ships for the use of the crew. These were to be provided at the public expense and put in charge of the schoolmaster. Chaplains and schoolmasters had become, within twenty years, part of the establishment of many ships, and with the appointment in May 1837 of teachers of elementary education—reading, writing, and arithmetic for sailor-boys, marines, and seamen who needed it—there began another important era in the Navy's life. The books in particular were welcomed in the ships. Exclusive of Bibles,

270 volumes were provided for the large ships and 100 for the smaller vessels.

Officers had a wide discretion in connection with the cleaning of their ships, and some of them developed a passion for that attribute which has been given second place to godliness. The care of the decks was carried to a grotesque extent, and the greatest problem of an officer's life became the choice of one of the four existing ways of cleaning decks. In the first method, large quantities of sea-water, with friction by brushes, was used; in the second, a small quantity of water was poured on the decks, which were then thoroughly rubbed with smooth flat stones, generally sand-stones, called by the men holy stones, for the purpose of removing stains, grease, etc.; in the third, holy stones were used for rubbing, but instead of water they were applied directly over a small portion of sand, cold or heated, which had been scattered on the decks. The fourth plan, which was not often employed, was called sprinkling and scrubbing. By this method the decks were slightly wetted and rubbed with brushes or dried by cloths, as much as possible. In ships which were washed daily, or in which wet-cleaning was employed, the decks were never thoroughly dry; dry-stoning caused a great deal of dust, which irritated the eyes, settled on the clothes, got into the men's chests, and generally was an intense annoyance; yet from the medical point of view this dry-cleaning was considered preferable to cleaning by any method in which water was used, although the system did not produce such beautiful decks as those which resulted from holy stoning. As the officers who had a craze for spotless cleanliness put this form of virtue

before all others, it followed that the comfort of their men took second place to the appearance of the ship.

In the early thirties, ships were seldom longer in commission during peace than three or four years, three being the average for foreign service. At the end of such periods the ships returned to England and the crews were discharged, and it was quite a chance whether, on re-entering the service, many, or indeed any of them, returned to the station where they had been employed. Strange things were still done by the men of the Navy. Considerable numbers entered from the merchant service, stating their ages as they pleased, sometimes under, sometimes over. If a man wished to be invalided he often feigned disease, even if he had none, and would declare that his age was sixty, although only eighteen months before he had vowed that he was thirty-nine.

Disease, even of the types which had caused so much havoc in the Navy continuously from the time of the *Great Harry*, was rapidly disappearing from battleships and other vessels. Statistics were being carefully prepared, and there was no longer a haphazard method of doing things and treating sailors as if they were of less account than the live-stock carried on board.

When Victoria became queen the largest proportion of mortality resulted from service in frigates, the next in corvettes, etc., the next in ships-of-the-line, the smallest being in steamers. In the first class of vessels mentioned the annual rate of mortality was 9 per 1000, in the second 8·1, in the third 7·6, and in the fourth 5·4, of the mean number employed. After steamers, ships-of-the-line had the lowest proportion of deaths, although

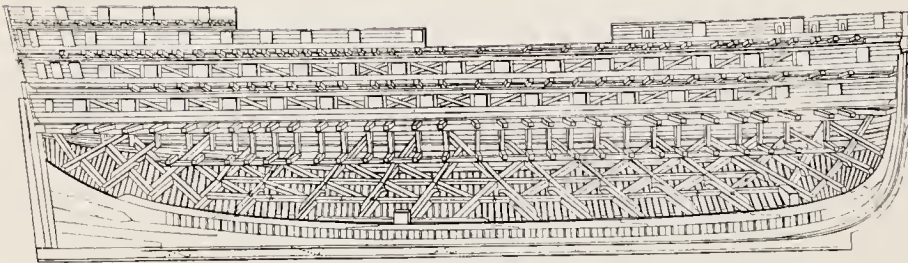
the rate of invaliding was the highest, being nearly double that of the steamers. Ships-of-the-line, indeed, held their own, and more, in comparison with all other craft, except steamers. Even the crude paddle-propelled craft of the thirties showed an infinite superiority over the finest sailing battleship that was ever built. The sentiment surrounding the wooden walls died hard, but it had to go in face of the undoubted and great advantages which steam conferred upon the Navy, advantages which included much greater safety, increased speed, more comfort in living, and a far less monotonous existence than that of the days of unassisted sail.

The *Warspite*, a ship-of-the-line carrying the flag of the Commander-in-Chief, had been, at the end of 1830, eighteen months in the harbour of Rio de Janeiro without changing her position. There was at that time an epidemic of ulcer in the South American Squadron, and out of 335 cases no fewer than 146 were in the *Warspite*—a state of things due to her long continuance in harbour and the peculiar susceptibility of some members of her crew who had joined from home—indeed, the disease was almost entirely confined to new men, recently recruited marines, and sailor-boys, many of whom were embarked for the first time. The *Warspite* had a complement of 588, and was a thoroughly clean and well-conducted ship.

From June 1829 until January 1833 the *Warspite* was anchored in the harbour. For two years she did not move her position, then she was absent for five months at the Cape of Good Hope and Isle of France, after which she returned to the harbour of Rio and remained there a year before leaving for England.



H.M.S. *QUEEN*, 110 GUNS, THE FIRST THREE-DECKER LAUNCHED IN
 QUEEN VICTORIA'S REIGN.



SEPPINGS'S TRUSSED FRAME OF A LINE-OF-BATTLESHIP.

Throughout that long period the ship's company enjoyed a high degree of health. In the last three years the total number of deaths was only eight, of which four were due to accident and the rest to disease. Owing to the frequent reception and discharge of supernumeraries the ship's company varied greatly ; but the average was more than 600. It was rightly considered that no higher degree of health could be supposed than that which was enjoyed by the *Warspite* in Rio harbour.

One of the finest examples of the sailing ship-of-the-line belongs to the thirties. This was the *Queen*, a three-decker of 110 guns, laid down at Portsmouth Dockyard in 1833 and launched in 1839, the first three-decker of Victoria's reign. For twenty years she was a magnificent sailing ship, then, in 1859, at Sheerness, she was converted to a two-decked ship. Her heaviest gun was a 32-pounder. She carried 900 men. The length of the *Queen* was 204 feet 3 inches, and her breadth 60 feet, her displacement being 4476 tons. She was spoken of as an enormous ship, and in sailing and stability was superior to other three-deckers of her time.

Some interesting comparisons between a ship-of-the-line of the period of change and the *Victory* were given by an officer who had served in both. The modern ship was the *Anglia*, which, he said, dealing with the years 1850-56, had been built three or four years previously by the most celebrated naval architect of the day, and her tonnage was greater than that of any other British man-of-war afloat. According to the measurement of the day, her tonnage was, in round numbers, 3100, which, by the modern system of measuring, would considerably exceed 4000 tons. The most noticeable feature of the

Anglia was her great breadth of beam, 60 feet, and she was further distinguished by a very handsome elliptic stern, which in those days was not so universal as it became a few years later. In length she was up to the average of other ships of her class—somewhere between 230 and 240 feet. The *Anglia* had most beautiful lines, full of graceful swells and curves, and none of the wall-sidedness of modern constructions. The one slight defect in her external appearance was that her cutwater was a trifle too straight; but looking at her from a quarter view, where this defect could not be seen, she was perfection itself. Her masts and spars were the biggest and heaviest carried by any ship, and the *Anglia* was indeed what her people often affectionately called her—"The Pride of the Sea."

The gun-room of the *Anglia* very much resembled that of the *Victory* in general appearance, but was considerably larger. A good deal of the space on each side was occupied by a great gun, but there was no awkward sternpost knee, as in the *Victory*, to lessen the space and trip up unwary people. The gun-room was a fine apartment, with a transverse breadth of about 60 feet and a fore and aft breadth of about 20 feet. The steward's pantry was outside, but it communicated with the mess-room by means of a door and a window in the centre of the bulkhead which separated the gun-room from the lower deck outside. A very long table, at which forty persons could be seated, stood a little abaft the centre of the room, and across the stern was a range of lockers for stores. The tops of the lockers were fitted with leather-covered cushions that formed a comfortable couch. Overhead between the beams on the after-side

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modious in the after-cockpit. It adjoined the bread-room and was more light and airy than the other "dens" dignified with the name of cabins. In addition to the cabin for the purser there were in the after-cockpit cabins for the two junior lieutenants, the surgeon and assistant surgeons, and the three lieutenants of marines. The *Anglia* had large and lofty main and lower decks, with roomy quarters between the guns, and the captain's cabin, the wardroom, and the gun-room were very spacious; while even the cockpit, compared with that of the *Victory*, was a luxurious sleeping and dressing room for the midshipmen, and there was no danger of knocking one's head against the beams, as in Nelson's flagship.

The armament of the *Anglia* was the heaviest carried by ships-of-the-line of her day. On the upper deck she carried twenty-six 32-pounders of 42 cwt.; and under the poop thirty-two 32-pounders of 56 cwt. on the main-deck, and thirty-two 8-inch guns of 65 cwt., throwing a hollow shot of 56 lb., on the lower deck. In addition to these guns, which formed the armament proper, she carried for boats one brass 24-pounder howitzer and one 12-pounder howitzer for the launch, and one 12-pounder howitzer for the barge and pinnace respectively. The *Anglia's* full complement of officers and men was 820.

Before wooden sailing ships-of-the-line were superseded, some experiments were made to determine their relative superiority. These took place in 1845, the competing ships being the *Queen*, *Albion*, *Rodney*, *Trafalgar*, *Vanguard*, *Canopus*, *St. Vincent*, and *Superb*. The trials showed an enormous difference in the greatest "inclination rolled or lunched to," the *St. Vincent* being least, with 18°, the *Queen* next, with 23°, and the *Rodney*

following, with 27° ; then came a great jump, for the *Superb* had a roll of 40° , the *Vanguard* 42° , and the *Albion* 45° . The *Albion*, indeed, was a notorious roller, and a peculiarity of her performance was that she rolled very quickly. Her captain, in reporting on her conduct to the Admiralty, said, "It is the quickness of the *Albion's* motion which is remarkable."

A notable feature of the experiments was in connection with such an apparently unimportant detail as the hammocks. In competition with the *Trafalgar*, the *Queen* in two and three-quarter hours gained 380 fathoms; but she had her hammocks below, whilst the *Trafalgar* had hers stowed, and as the weight of her hammocks was eleven tons, and the surface they exposed above the hammock-netting was 486 square feet, her captain held that the ship was so differently circumstanced that the apparent result of this trial was worthless.

The experiments also showed the value of coppering. The *Superb* at the beginning of the trials was invariably beaten; but on being recoppered she frequently proved the fastest ship in the squadron. The *Canopus* had some of her sheets of copper off, and some in parts much crumpled, these having been on for nearly four years. Her captain considered that these were disadvantages which should be taken into account in comparing the vessel's performances with those of the other ships. Allowing additional ballast and new coppering enormously improved the sailing of one or two of the ships, and so complete a change took place in one of them that her captain declared that he could scarcely believe she was the same vessel.

Actual sailing experiments proved equally interest-

ing, and excited the utmost emulation in officers and men alike. When the *Raleigh*, a 50-gun frigate, was commissioned for sea in 1846, her captain was ordered to try her powers of sailing in relation to those of the *Vanguard*, *Canopus*, *Brilliant*, and *Superb*. On 30th May, with the water smooth and the wind moderate and steady, the *Superb* and *Raleigh*, under all sail, began a running trial which lasted three hours. The *Raleigh* beat the *Superb* 1340 yards, her rate of sailing being from six to seven knots, and her angles of rolling from ten to twelve degrees. During the same day the ships tried their comparative powers of sailing to windward, under all plain sail, except the royals and flying-jib. In two hours the *Raleigh* made one tack more than the *Superb* and beat her 1000 yards to windward, her rate of sailing being from four to six knots. On 24th June the *Raleigh* competed with the *Vanguard* and *Canopus*. There was a strong breeze, squally weather, and a rough head sea. When the trial began the *Raleigh's* rate of sailing was rather more than six knots; fifty-seven minutes later it was ten knots. She gained considerably in sailing to windward on both the *Vanguard* and the *Canopus*.

So far as the line-of-battle ship went in subsequent experiments the *Superb* excelled; the *Vanguard* and *Canopus*, which were next in order, being equal. The *Albion* took the lead of the *St. Vincent*, which was followed by the *Queen*. The *Rodney* was inferior to all the rest of the ships except the *Hibernia*.

Some striking trials took place between the *Superb*, which was an 80-gun ship; the *America*, built in 1810 as a 74-gun ship and cut down to 50, and the



TRANSITIONAL



RAM BOW.

Thetis, a 40-gun frigate. The *Thetis* in many ways showed extraordinary superiority, for during one trial, with the wind abeam and a long swell, she beat the *Superb* at the rate of 2500 yards an hour, the *America* being second with a decided advantage over the *Superb*. The swell lessened considerably during the trial, with the result that the *Thetis* gained only at the rate of 700 yards an hour, and the *Superb* took second place, the *America* being the third ship. The *Thetis* was pitted against other ships-of-the-line on various occasions, in all sorts of weather and in all kinds of trim, and she maintained her superiority, defeating the crack battleships and gaining on the *Hibernia* as much as 3000 yards an hour, "dead to windward."

Those trials not only remain as interesting records of what the last and finest of the old British battleships accomplish under sail, but they also serve to show the intense interest that the old seamen took in their ships, and the splendid efforts they made to achieve success. The experiments covered a period of several months, and officers had every opportunity given to them to show who were the most skilful seamen, and whose ships were best. The records were carefully prepared and sent in to the Admiralty, by whom they were subsequently published. That act in itself was an indication of the increasing attention which was being given officially to the Navy, and showed the serious resolve of the Admiralty to get at the best possible data. Compared with present-day achievements these were small indeed; but it is possible that they would have had far-reaching consequences on the Navy of sail had it not been that canvas was practically doomed by the advent of steam.

Already it was realised that not even the fastest ships in the Navy could compete in ordinary circumstances with a steamship, crude though the early paddle warships were. The paddle was triumphing over sail, and the side-wheel was to be completely conquered by the screw propeller.

The old sailing days had given noble ships-of-the-line which had been able to maintain high rates of speed in suitable weather, while there were famous vessels like the *Arethusa*, which could put on record their fifteen and sixteen knots ; but these were exceptional, and the results which had been given indicate the average performances of the finest ships-of-the-line.

A remarkable ship was launched in April 1905 by Messrs. Vickers, Sons & Maxim, from their yard at Barrow. This was a full-sized replica of the *Exmouth*, of 90 guns, which carried Admiral Seymour's flag in the Baltic during the war with Russia. The vessel was built to succeed the original vessel which since 1876 had been used by the Metropolitan Poor Law Unions to train lads for the sea services. Outwardly she resembles the old two-decker with her two tier of gun-ports, her square stern, her three masts, and her historical figurehead. The dimensions are 300 feet by 53 feet by 39 feet to the upper deck ; but beyond the general appearance there is little to compare in this vessel with her predecessor, for she is mostly built of mild steel, with the exception of the outer plating below the water-line, which is of iron, to avoid corrosion. So it comes about that the latest modern improvements are incorporated in a ship resembling the *Victory* and the other wooden structures with which our greatest naval triumphs were won. The scientific modern constructor has shown

what it is possible to do even in a structure on ancient lines accommodating 600 officers and boys, as large a number as formed the complement of many a ship-of-the-line. The lavatories for the boys are under the fore-castle. On the lower deck, which is a mess-deck, 236 hammocks can be slung, while mess-tables, seats, and lockers are provided for the boys. On the sleeping-decks the air space per boy is about 400 cubic feet, and in the schoolrooms it is 121 cubic feet. An electric power station is fitted in the ship, and this enables a thoroughly efficient system of ventilation to be provided, and for the air to be cooled in summer and heated in winter. It has to be remembered, of course, that the *Exmouth* is stationary, and that it is possible to arrange and provide in her comforts and conveniences which would not be practicable at sea, especially in bad weather ; but the modern designer, working on lines that have served as guides for many centuries, has been able to devise a remarkable improvement on anything known in the days of sail and canvas. This unique ship is fascinating as showing what could have been done in the old Navy even without the enormous advantages attending the introduction of steam. How much suffering and death would have been avoided if in the old days it had been possible to employ steel and iron instead of wood to build the ships in which such wondrous things were done !

There is not much romance in the picture presented by the use of metal and machinery instead of oak ; but if such structures as the *Exmouth* had been afloat in former days, quite irrespective of the blessings and advantages of steam, there would not have been

chronicled the losses by disease and storm which marked every stage in the advancement of our wooden walls.

It is interesting to note that the date of the launch of the existing *Exmouth* was 20th April, and that on the fourth day of the same month there was sold at Chatham Dockyard, for £4150, her predecessor, which was described as "originally a 91 line-of-battle ship." This sale was one of the auctions which are conducted periodically by order of the Lords Commissioners of the Admiralty, by Messrs. Fuller, Horsey, Sons & Cassell. The particular sale mentioned realised a total of £138,000, and it included the famous battleship *Monarch*, built at Chatham in 1868. She realised £14,550, a small sum indeed compared with her original cost of about £340,000. The *Northampton*, equally celebrated in her way, and constructed at a cost of about £370,000, was disposed of for £15,800; the *Royal Adelaide*, an old second-rate, fetched £3500.

CHAPTER XI

TRANSITION

MEMORY is busy with those officers and men of the old Navy who are still alive, and have witnessed such unparalleled developments in battleships. In former days a man might live to be a centenarian and see no greater change than that from beak-head to rounded bow, or from square stern to round or elliptical, and in rig from a lateen sail to a spanker. For all practical purposes the ship-of-the-line when he died was like the ship-of-the-line when he was born. But with a generation that still survives the case is different, because they grew up with the oak and canvas, and saw the transition from sail to steam and from timber to iron and steel. They beheld, in vessels like the *Queen*, the *Marlborough*, and the *Duke of Wellington*, a completeness and perfection in ships-of-war that had been undreamt of, and an improvement in the conditions of life on board that was not thought possible even a few years before the Crimean War. It was not till 1840 that Sir Robert Seppings died. For many years he was Surveyor of the Navy and brought about numerous changes in the construction of warships, the greatest of these being the round stern, which occasioned long and fierce dispute; but incontestably proved its superiority over the square stern which had existed since Henry's time.

Sir Robert Seppings did for the old Navy what has been accomplished by Sir Philip Watts in designing the *Dreadnought*. In addition to revolutionising the construction of the stern of the ship-of-the-line, Seppings also completely altered the arrangement of the bow. Up to the time of Trafalgar the bow was straight across at the cat-head and so low as to be in a line with the upper deck portside, and was boarded across with thin boarding and stanchions. This, however, did not give strength enough to resist even grape-shot, and consequently crews were greatly exposed to raking fire. The *Victory* after Trafalgar gave evidence of the extreme weakness of this particular form of structure, for grape-shot had penetrated her beak-head, while the round solid part of her bow had in many instances successfully resisted the largest shot. The old form of bow was also wanting in strength. It was one of the weakest parts of a ship, although obviously it should have been strong enough to withstand the heaviest onslaughts of the sea and other forces. The bow was continually subject to leak, and consequently a ship's stores, particularly the gunner's, were diminished because of the addition of water ; indeed the life of the ship herself was shortened generally, and the weak bow proved a source of constant danger to the vessel and discomfort to the crew. The introduction of Seppings's system of construction proved an undoubted advantage to the ships of the Navy, and full proof was given of the superiority of his methods by the behaviour of the *Asia* at Navarino, where her rounded stern resisted far more successfully than any square stern would have done the heavy fire of the enemy's guns in the batteries ashore.



THE SQUARE STERN OF H.M.S. VICTORY.



E. W. Cooke.

THE CIRCULAR STERN OF H.M.S. ASIA, FLAGSHIP AT
NAVARINO.

Algiers, attacked on 27th August 1816 by the fleet under Admiral Lord Exmouth, was the scene of a very heavy bombardment by ships just preceding the transition period. Half-a-dozen line-of-battle ships and four frigates fired the enormous number of 39,000 rounds, and the Dutch allies discharged more than 10,000 rounds, the total weight of the round shot being estimated at 500 tons. The *Impregnable*, one of the ships engaged, had 233 shots in her hull, and her loss in killed and wounded was 210, a heavy total.

Navarino followed eleven years later, and with that battle, described by the Duke of Wellington as "an untoward affair," the glory of the sailing ship departed, and the final stage of transition was reached, for steam was coming in as conqueror. The operations of 1840 on the Syrian coast to some extent proved the triumph of steam and the defeat, nay, degradation, of sail, for the British Commander-in-Chief, Sir Robert Stopford, transferred his flag from a three-decker, the *Princess Charlotte*, to a steamer, so that he might more quickly move about.

The bombardment of Acre, during the Syrian War, was an actual link with the Trafalgar days, for on board the *Bellerophon* were guns that had been used in the *Victory* on 21st October 1805, and fighting in the battle were officers and men who had served under Nelson. One of the guns used in the *Victory* and the *Bellerophon* is in the grounds of Greenwich Hospital. A survivor of the battle, who was armourer's mate in the *Revenge*, one of the ships-of-the-line engaged, gave me, in his Dorsetshire home, some details of the fight.

Acre was supposed to be impregnable, and not a

few men who had gone boldly into action against ships at sea had no fancy for the forts. One captain, said the survivor, was so badly upset that he could scarcely read the Articles of War to his ship's company, and a gunner went mad with fear that the fleet would be blown out of the water. He laid a train of gunpowder to the magazine, but a marine sentry saw the fuse in time and put it out. When the gunner was found he was dead, having cut his throat. "The noise was terrific," said my informant, "and the smoke became so dense that it was scarcely possible to see either man or ship or shore. In the low 'tween-decks of the ships, the gunners, nearly naked, fought just as they had fought at Trafalgar. Our shot and shell told heavily on the batteries, while we were so placed that the Egyptians could not hull us. Most of their shots went high, and did damage mostly to our spars and rigging. The ships-of-the-line and the frigates boomed away with their old muzzle-loaders, while the steamers sent shells screaming into Acre—and every shell did ten times more damage than the old-fashioned round shot.

"A little drummer was standing by the mainmast of the *Revenge*, with his drum in front of him. A shot came from one of the batteries, crashed through the bulwarks of the ship, and smashed a piece out of one of the starboard guns before it went and buried itself in the sea. The shot whizzed past the drummer, just grazing his breast, but not touching him. There he stood, drum in front of him, looking just as if he was waiting for the order to beat to quarters; yet he was dead when I saw him, killed instantly by the wind of the shot, which had not even scratched his skin.



TRANSITIONAL (BATTLESHIP).

Transitional 'C' class.

“Our ship was crowded with prisoners after the battle, many of them having only one eye. Thousands of poor Egyptians had been made to fight, whether they liked it or not, and the one-eyed men were those who as children had had their sight partially destroyed by their mothers, so as to escape conscription ; but the Viceroy, when the children were old enough, forced them to go into the army and learn to shoot with the eye that was left.

“When we got ashore parties were told off to gauge and collect the shot we had fired from the ships. As armourer’s mate I had a gauge with me—a primitive sort of ring on a stick. I put the gauge over any shot I came across, and if the ring fitted, the shot was ours, and was taken to the boats and sent to the ship. Other ships’ shot fitted my gauge all right—but I dare say other crews got our shot, so it worked out fairly enough, taking it all round. We got the shot back into the magazine, and there it was, ready to be fired again. I wonder what the sailors of to-day would say if they had to go after their own shot and pick it up and bring it back—but they’d have to go a wonderful long way for some of it, judging by what they say of the immense distances that the big guns will carry.”

Another survivor—this of the time of the Crimea—gave me first-hand details and impressions of the Baltic Expedition, which crowned the transition period. In March 1854, Queen Victoria led to sea a British fleet under Sir Charles Napier, to act against Russia in the Baltic. Napier was second in command at Acre, and a famous link not only with the navy of Nelson but also with the army of Wellington, for he served

in Portugal as a volunteer during the Peninsular War, and was present at the battle of Busaco. The British and French fleets bombarded and captured Bomarsund; and afterwards attacked Sweaborg, called the Gibraltar of the North, because of its strength. For two complete days there was a heavy bombardment, but the Allies failed to subdue the fortress, and the fleets returned home.

A second expedition sailed early in 1855 under Admiral R. S. Dundas; but again the fleets were unsuccessful, and Sweaborg remained unconquered. My informant served in the *Cressy*, one of the screw ships of the transition period. He was at the time a powder-monkey, and Bomarsund was his first fight. "I had to skip a lot between the magazine and the guns," he said, "and keep the sweating, swearing, broiling men supplied with ammunition. My gun was one of the very foremost in the *Cressy*, and I had quite a long way to go to the magazine, so that whenever we were in action I saw pretty nearly everything that was going on. I can still picture the half-naked men at the guns in a smother of choking smoke that caused a dreadful thirst, and I can see the tubs of fresh water and baskets of biscuits on the deck near the gun crews. When a man wanted a biscuit or drink he got it—provided the captain of a gun didn't keep him too busily employed in fighting. The French had no fewer than seven sailing ships-of-the-line, and only one screw ship of the same class; while we had thirteen screw steamers of the line, amongst them being the *Cressy*, with her sister ship the *Majestic*." (The *Majestic* was a screw two-decker of 80 guns, built at Pembroke in 1843-49,

and converted to screw in 1853. Her burden was 2590 tons, her length 190 feet, and her breadth 57 feet.)

"Many freaks were brought into existence at that time, but none stranger than a couple of floating batteries, or bombs, which had been sent out from England. One was called the *Hecla*. The lower part was shaped like a boat, and on top of this was a perfectly flat deck, or platform, not very big—say about twenty feet or so in diameter. Only one gun was mounted, a muzzle-loading sixty-eight pounder, which was slung from an arrangement of sheers and a derrick and not mounted in the ordinary way. Each bomb carried about fifty men as a crew.

"I was standing on the fore-castle head of the *Cressy*, watching the *Hecla*, when I noticed a terrific explosion. When the smoke had cleared away I saw that the floating battery had been split completely in two, and the men were struggling in the water. There were some exciting scenes as the boats of the nearest ships were got out and hurried to the saving of the *Hecla's* crew.

"I have mentioned infernal machines, which, in those days, were quaint and primitive inventions, like a sugar loaf. These cones were made of galvanised iron, and were about twenty inches long and sixteen in diameter. Each machine held about ten pounds of powder, which was fired by sulphuric acid. I remember them well, because for some time I had to take care of one. It had two tiny things at each side of the top, the nose, so to speak, being downward. I do not quite know what these little things were, but perhaps they were fuses. Anyway, there was also a tiny glass tube in the centre

of the machine, and the little fuses were connected with the tube, which a shock would explode.

“We had plenty of tedious time on our hands during that long, weary investment of Sweaborg, and part of the leisure was spent in dragging for mines with grapnels. I saw about thirty brought up. As a rule they were handled very gingerly, because men were rather afraid of such things in those days. They were not quite so much accustomed to startling inventions as we are in these times.

“The *Excellent*, which afterwards became the gunnery ship at Whale Island, Portsmouth, brought up one of the machines with the grapnels, and it was taken on board. It aroused a great deal of interest, and the crew crowded round it, curious to learn something of the invention, which was still a mystery to most of us.

“I suppose the machine received an unexpected blow, or was suddenly and violently disturbed, for it exploded with a terrific report, and scattered the group of officers and men who were clustering around it. One officer and two or three men were seriously injured by the accident, which made us all in the fleet very chary of handling these uncanny cones. They were said to be the invention of a philosopher; but on the whole they did very little damage, although one ship, the *Merlin*, a paddle-box war vessel, was partially disabled by the explosion of one over which she passed. Now, at this long distance of time, I am almost disposed to think that their existence was a good thing for us, because they gave us something to do, and kept us busy and excited—and there is nothing worse in time of war than

inactivity. Slackness gives you too much time to brood, and when sailors begin brooding it is a black look-out for business. We had plenty of time to think in the Baltic, and that was perhaps partly the cause of the diseases which attacked us, and from which we suffered terribly. Death came to us, and in one of its most awful forms—cholera. How the disease was brought into the ship I do not know, and I do not think that the mystery has ever been explained, but I imagine that it originated with a couple of prisoners, Finns they were, who had been captured and were kept on board.

“Cholera was very bad amongst the Russians, and although these two men did not suffer from it personally they could be the means of spreading it.

“Time after time I saw big fine fellows buried—men who had been attacked in the most mysterious way. I do not know what the total number of our loss was, but we often had as many as seven or eight funerals a day. It is strange but true that the finest and strongest men seemed to fall the easiest victims; and it was said in the ship that the heartiest eaters were the worst sufferers and commonest victims.

“As soon as death came the body was sewn up in a hammock, and, after a hurried service by the chaplain—every ship carried her clergyman—was thrown over the side. I got so used to the sight that it scarcely affected me—and I was young, too, which makes a lot of difference to health and spirits. I never had the slightest fear of the disease, and that is perhaps one reason why it never touched or troubled me, although on that point I may be wrong. It was impossible to say where the cholera would strike, or what it would do. It might, as

it often did, kill swiftly, or give a man a dreadful short illness and let him get over it. Sometimes, say, three men would be in hammocks alongside each other. The cholera would come and kill the two end men and leave the middle untouched and unconscious that anything had happened, until he woke and found that his shipmates had gone over the side.

“But even in those gloomy and tedious days we had our little excitements. One of the liveliest things I remember happened at Copenhagen in going out. We were taking in cases of spirit for the ward-room officers and the captain. The cases were hoisted from a lighter alongside and passed through the lower deck ports, the men standing at certain distances from each other and passing them along aft to the store-room. At the end of the day, when all the cases had been taken from the lighters, it was found that one was missing. Not a trace of it could be discovered. There was checking and re-checking, but all that could be learned was that the case had disappeared. Lights went out at eight o'clock. Two hours afterwards there was a tremendous uproar. I leaned out of my hammock and saw that the noise was made by a crowd of jolly and drunken Coastguardmen.

“The captain and the master-at-arms hurried up, and after a lot of scuffling and confusion the merry-makers were put in irons on the upper deck, and they had their spirits quelled in a very unexpected fashion, for next morning the doctor ordered that the hose should be played on them—a performance which both cooled and sobered them. Then the mystery of the missing case was solved. The Coastguardmen had smuggled it



THE TURRET BATTLESHIP.

away and managed to get the bottles into one of the guns. Having done that they replaced the tompion, and when lights were out they got at the bottles in the darkness and began to make a jolly time of it. The actual thieves were never discovered, if it was really a case of stealing. All that could be proved against the offenders was that they were drunk, and I dare say it was considered that the irons and the hose-pipe were sufficient punishment for the crime.

“These Coastguardmen were fine fellows, but there was nearly a mutiny amongst them. In order to man the ships it had been necessary to call the Coastguardmen out. In the *Cressy* these men brought their own clothes with them, but our captain was a martinet, and insisted that they should take up slops, the material from which the crews’ clothes generally were made. The Coastguardmen grumbled and protested, and proclaimed the right to wear their own clothes, which were smarter and better than the ordinary slops. They felt sore, too, because they had been torn away from their wives and homes.

“The captain sent for the Admiral, and Sir Charles came, in his famous white waistcoat, discoloured with the snuff which he was always taking. All hands were mustered, more than a thousand strong—and the Admiral heard the complaint. To the joy of the Coastguardmen he sided with them, and they were not forced to take up the slops they hated so much. The captain did not like being beaten; but it was better that he should feel sore than that there should be a mutiny.

“What happened to the two Finns? Well, poor fellows, I am glad to say that they escaped the cholera

and lived to go ashore again. We bore them no ill-will ; in fact, we became very friendly with them, and used to watch them as they patiently carved walking-stick heads, some of which were very fine. They sold these things for very small sums amongst the crew, and in that way got together a little money, which I dare say was very welcome and an immense help to them when they were put ashore.

“Admiral Sir Charles Napier had a great reputation, and there was an unbounded belief that he would succeed in doing what proved to be impossible. How the general public looked upon his task was shown by some doggerel which was sung at the time, called ‘Give it to him, Charley.’ The poet said—

“‘I’ll tell how British seamen brave
Of Russian foes will clear the wave ;
Old England’s credit for to save,
Led on by gallant Charley.’

and finished by declaring that—

“‘No Russian foe can e’er withstand
So brave a man as Charley.’

“The summer passed, and the terrible winter was coming, the bitter cold which would turn the gulf into a mass of ice and make it impossible for us to remain at sea ; so preparations were made to return home, and home we came. And to what ? A storm of abuse and bitterness hurled at the Admiral for not having succeeded in doing what all who understood the difficulties in his way knew to be impossible. There were many quarrels between public men in the days of the Crimea ; but there were none more bitter than the troubles which

arose concerning Sweaborg. It was forgotten that the Admiral had been sent away with a fleet which in many respects was badly manned, a fleet which had not found itself and which did not find itself until a year later, when Admiral Dundas went out with more than eighty ships, mounting more than two thousand guns. Sixteen French ships, with more than four hundred guns, joined him, making a magnificent and powerful fleet, such a sight as will never again be witnessed, I think. Yet the whole of that vast and stately array could be shattered, if it floated now, by one small modern cruiser, because she could keep out of the range of their guns and pound and crush the wooden hulls at her leisure. She could sweep them off the seas, and not suffer a scratch. I think it is only the old sailors amongst us who fully realise what marvellous changes time has brought about in ships and guns, and in officers and men, too. The sailor of the time of the Baltic would not know his successor of to-day, the well-clothed, well-fed, and well-looked-after bluejacket.

“The bombardment began on August 9th, 1855, and I do not think a grander sight was ever seen than the enormous Allied Fleets attacking the forts which we got to know so well, and hate so much; and nothing more solemn could be heard than the drums beating to quarters, nothing more thrilling seen than the men stripping to the waist and taking up their positions at the old muzzle-loaders.

“The bombardment of Sweaborg was one of the most extraordinary battles that were ever fought, and one of the longest, for it lasted, practically without a break, for forty-eight hours. You know how circus

horses run round a ring? Well, in the same way, the ships of the fleets went round the forts which protected Sweaborg, delivering their fire and making a wonderful battle-ring. The sight itself was astonishing, the forts blazing away on all sides, and the stately ships going round and round with their guns crashing from their ports and the heavy wreaths of powder-smoke hanging low over the water.

“For nearly fifty hours the fight went on. Men who had been white at the start were black with grime and smoke and sweat; and men who had begun in perfect health and strength were utterly exhausted. Yet there was no time to rest, no chance of sleeping, though occasionally a gunner would fall at the side of his smoking weapon and snatch a little rest, while there were instances of seamen going about their duties automatically, sleeping as they stood, and serving and working in the sweltering broadside batteries. It was not a battle remarkable for casualties, except our freedom from them, for to a large extent we were out of the reach of the guns of the fortress. We were in dangerous waters without pilots, and had no buoys or lighthouses to guide us.

“During the two long days and nights the bombardment continued; then it ceased, because the truth had at last to be recognised that the fortress was impregnable. The game was up, and both our own fleet and the French came away. The Baltic Expedition had proved a failure, and the Russians were able to say that at any rate Sweaborg was unconquered.”

That first-hand story of the severing of the connection with the old school of admirals and the old navy of wood and sail and muzzle-loaders, grog and the “cat”—



SILENT WATCHERS OF A LONDON THOROUGHFARE.



THE FIGURE-HEAD OF H.M.S. *EDINBURGH*.

for flogging still existed—gives a vivid impression of the state of the fleet and the meaning of being at sea in ships-of-the-line. The transition was almost completed, for already there was being evolved the ironclad, and very soon most of the great bulky wooden structures were to be towed away and broken up, leaving, however, something of themselves as relics.

These mementoes of old battleships are preserved in various forms and many places; but the greatest are the fine figureheads which may be seen in the Royal Dockyards and at Baltic Wharf, Millbank, London. These figureheads are interesting and valuable, not only because they are actual links with the historic fighting past, but also from the fact that they represent a forgotten art, and one which in the days of the wooden ship-of-the-line had reached a state of remarkable excellence.

Figureheads were not carved from solid blocks of wood; they were built up, bit by bit, by men whose lives were devoted to the work, whose souls were in it, and who seldom received adequate recognition of their skill. They came, they toiled, they went—and they are forgotten.

The Government's trophies are admirable examples of this form of cleverness; but specimens as fine are in the possession of private owners—Messrs. Henry Castle and Sons, Limited, at Baltic Wharf, within a stone's throw of some of the show places of the capital, particularly the Tate Gallery, which thousands of visitors see yearly, and yet they miss these brine-steeped masterpieces which have plunged into every sea in the world, have faced unflinchingly the battle and the gale, and are now silent watchers of a London thoroughfare.

At Baltic Wharf you may pass down an avenue, one side of which consists of old warships' timbers, sawn into firewood blocks, and the other of old figureheads. You stand on the spot, too, where Mr. Stacey Marks painted his famous picture "Old Friends," representing two naval pensioners looking up at the figurehead of H.M.S. *Edinburgh*. This painting was exhibited at the Royal Academy in 1879, and attracted universal attention. In more recent years other marine artists have received inspiration at the Wharf for pictures.

Messrs. Castle are shipbreakers to the Admiralty, and a great number of ships have passed through their hands, many of the vessels being of historic memory. These have been reduced to firewood and garden seats. Most notable of the many relics which Messrs. Castle have preserved is the *Téméraire* mantelpiece. This is made from mahogany taken from H.M.S. *Royal Albert*, one of the last of the three-deckers built for the British Navy, and is inlaid with old oak recovered from the wreck of the *Royal George*. The mantelpiece at each end is supported by a figure of Atlas—the actual figures from the stern of the *Téméraire*, which was broken up in 1838. Turner's picture of this ship being towed to her last berth is one of his most celebrated works. The *Téméraire* was one of the hardest fighting of the British ships at Trafalgar. The price put upon the mantelpiece is four thousand guineas.

Famous figureheads have had strange vicissitudes. Take the case of Anson's *Centurion*. She was in commission for thirty years. When she was broken up, her figurehead, a carved lion rampant, measuring 16 feet in height, was sent to George III. He

presented it to the Duke of Richmond, who had the relic put on a pedestal at Waterbeach, near Goodwood, and there it served as a public-house sign. William IV., like a good sailor, begged the lion as a present on seeing its fallen state, and, having got it, he sent it to Windsor Castle, where it was placed at the head of the grand staircase. Some gentleman of taste, however, persuaded the monarch that the figurehead was out of character in such a position, as it certainly was, and the king commanded that the lion should be sent to Greenwich Hospital, and be put in the Anson Ward of that institution. Since then the figurehead has crumbled away, largely owing to neglect, and has long ceased to exist.

The *Victory* rides placidly in Portsmouth Harbour, her work done long ago, and now only a precious and unrivalled relic of the ship-of-the-line which repeatedly saved England. Until a few years ago her Trafalgar guns occasionally boomed for royal functions. Such a salute was being fired in honour of the Shah of Persia. I was watching her, and saw a bluejacket come out of a port, bestriding the muzzle of a gun and leaning backward to sponge the weapon. There was a flash and a report, which I thought came from a neighbouring gun. It was not till later that I learnt that the man had been blown to pieces, apparently by the explosion of an undischarged blank cartridge in the gun. From that time salutes have been fired by machine-guns placed on board the *Victory* for the purpose; so that within her are weapons representing the oldest and the newest types; she herself stands for oak and canvas, while always near her are the mightiest of modern mammoths.

A fighting companion of the *Victory* gave her name to the first screw line-of-battle ship built for the British Navy. This was the *Agamemnon*, which was laid down at Woolwich in December 1849. She was a reply to the *Napoléon*, which the French were constructing, and had a length of 266 feet from figurehead to taffrail, an extreme breadth of 53 feet, and a tonnage of 3102. The *Agamemnon* was launched in May 1852, and was looked upon with confidence and pride as a ship that would have the enormous two-fold advantage of sailing and steaming. She carried an immense spread of canvas, and her machinery enabled her to keep up a speed which was reckoned very great. The *Agamemnon's* armament was impressive, being thirty-six 8-inch guns on the gun-deck; thirty-four heavy 32-pounders on the main-deck, and twenty 32-pounders on the quarter-deck—ninety guns in all. As the flagship of Rear-Admiral Sir E. Lyons she took part in the bombardment of Sebastopol. Later, in 1857–58, she was more peacefully employed in laying the Atlantic cable, in conjunction with the United States frigate *Niagara*.

Battleships of the days of sail were last seen in their greatest glory at the finish of the Crimean War. On 23rd April 1856, which was St. George's Day, Queen Victoria, at Spithead, reviewed a fleet of 240 warships, which carried 2996 guns. Most of these ships had served in the Black Sea or the Baltic. Twenty-four of them were ships-of-the-line, and these alone accounted for 2029 guns. The fleet was led past the Queen's yacht, the *Victoria and Albert*, by the *Royal George*, of 120 guns, a screw ship of 2616 tons and 400 horse-power nominal, with a crew of 990.



H.M.S. *DUKE OF WELLINGTON*, 131 GUNS, 1852.



THE FRENCH SCREW BATTLESHIP, *LA BRETAGNE*, 130 GUNS, 1855.

Originally built at Chatham, where she was launched in 1827, she was converted in 1853, and fitted with horizontal trunk engines which gave her a speed of 9·3 knots. The *Royal George* was a famous ship of her day, another being the *Duke of Wellington*, launched in 1852. She was laid down at Pembroke as a sailing ship, but was converted into a screw while still on the stocks. A magnificent vessel of 3771 tons, she had a length of 240 feet 7 inches, a beam of 60 feet 1 inch, and a depth of 24 feet 8 inches. She had engines of 700 horse-power nominal, giving a speed to the great bulk of 10·15 knots. Her complement was the large number of 1100 officers and men, and she was designed to carry 131 guns. On her lower-deck she carried ten 8-inch guns, each weighing 65 cwt., and twenty-six 32-pounders; on the middle-deck thirty 32-pounders and six 8-inch guns; on the main-deck thirty-eight 32-pounders, and on the upper-deck, etc., twenty 32-pounders and one 68-pounder, the weight of this weapon being 98 cwt.

In 1846 the whole of the copper sheathing needed for the Navy was made at Chatham Dockyard, in the Rolling Mills. For the sheathing of a single line-of-battle ship more than 3000 copper sheets, weighing upwards of twelve tons, were needed. Enormous numbers of copper nails were required in the actual building of the ship, so that the cost of the total amount of this metal used was a considerable item in the expenditure on a ship-of-the-line. At Chatham, too, was a remarkable machine which made all the oars required for the Navy.

For a long time after sail had been abolished in

the Navy, it was still employed in training-ships to give that experience aloft which was considered essential to the seaman. For this purpose some fine old ships-of-the-line were employed, amongst them being the *St. Vincent*. Generations of cadets were trained in the *Britannia*, which passed away, to the real regret of many naval officers, but was succeeded by the present splendid barracks at Dartmouth.

The last great calamity associated with the days of sail in the Navy was the loss of the *Eurydice*. She was a fine frigate, as large as some of the old smaller ships-of-the-line, and was returning from a cruise when, in March 1879, she was caught by a heavy squall off the Isle of Wight, and capsized, the water rushing through the open ports before they could be closed. The whole of her officers, men, and boys, to the number of three hundred, with the exception of two, perished. Later, the *Eurydice* was raised, towed into harbour, and broken up.



FITTING OUT TO-DAY.

CHAPTER XII

THE JUBILEE OF THE IRONCLAD

THE year 1911 brought with it the jubilee of the iron-clad, for it is half a century since the *Warrior* was added to the British Navy and proved the last stroke of doom for the wooden walls. The costliest battle that was ever fought began when M. Dupuy de Lome, Chief Constructor to the French Navy, produced *La Gloire*, first of all sea-going ironclads. With her appearance began that war between gun and armour which has involved the expenditure of incredible sums of money, and necessitates the infliction upon all maritime countries of the heaviest burdens that people are called upon to bear.

The world's present annual naval charges are colossal, yet no one can foretell the result of any action at sea between the warships of the leading Powers. We can only guess—and hope and believe. Towards the end of 1910 the building of German battleships was temporarily stopped, because of the unexpected adoption by Great Britain of the 13·5-inch gun, the most powerful and terrible naval ordnance in existence. In theory the armour of the newest German ships should be able to withstand the shot of that weapon, but a halt was made, to try and make assurance surer.

La Gloire was a crude and clumsy creation, and

bore as little resemblance to the mammoth battleship of to-day as the Cunarder *Britannia* had to the *Mauretania*. Dupuy de Lome was making a departure which amounted to a revolution. There was something, but not much, in the way of experiment and experience to guide him. Valuable lessons had been learned from the Crimean War, and tests had shown the wonderful powers of penetration by shot and shell and the amazing resistance offered by armour; but there was not available the result of the great contest between the *Merrimac* and the *Monitor*. Dupuy de Lome courageously ventured into the unknown, and secured for his country that pre-eminence which it has always shown in connection with invention.

So far there had been no departure from wood as a material for building, and it was natural that the first armoured vessel should be a wooden structure. The *Napoléon*, a line-of-battle ship, was placed at his disposal, and in 1857, just after the Crimean War, Dupuy de Lome set to work to transform her. His task occupied him two years, and then the first sea-going ironclad compelled the world's attention and began the era of almost illimitable expenditure on navies. The *Napoléon* was a two-decker; the upper part of her was removed, and she was lengthened by 24 feet. Armour-plates of iron, 5 inches thick, were placed on her sides, the plates being backed with a thickness of 26 inches of wood. She was the first of all ships-of-the-line to be converted into a steamship. *La Gloire* was an experiment and a deviation; she was also the herald of a naval revolution. She was the gauge of battle for naval supremacy, and the gauge was taken up at once by England. France

had led before, and we had followed. Some of the finest vessels of the great sea wars had been built in France ; many had been added to the British Navy. We could not flagrantly annex *La Gloire*, being friendly with our over-Channel neighbours, but we set to work immediately to improve upon her triumph. Our answer to the challenge was the *Warrior*, in her day the pride of the Navy, and still in existence at Portsmouth as a workshop attached to H.M.S. *Vernon*.

Although the *Warrior* was not a battleship, still she must be dealt with, because of the momentous changes she inaugurated. She heralded a double revolution, because, in addition to being our first armoured sea-going ship, she was also our first ship of war to be built entirely of iron. The determination to construct a vessel of this metal and to encumber the sides with heavy armour dismayed the sailors of the old school, who could not understand how such a ship could float at all, much less keep the sea in bad weather. There was great and serious opposition to the undertaking of the work ; but the task was resolutely handled. The plans for the ship were prepared by Mr. Isaac Watts, who was at that time the Chief Constructor to the Navy, and Mr. Scott Russell, and the order was given in 1859, the year in which *La Gloire* was completed. In two years the *Warrior* was afloat, a noble tribute to the skill and genius of her designers.

The men who set to work to improve on France's creation were handicapped by want of definite information, for the *Warrior* was designed before *La Gloire* was launched. Nothing more certain was known than that the French ship was a cut-down timber vessel,

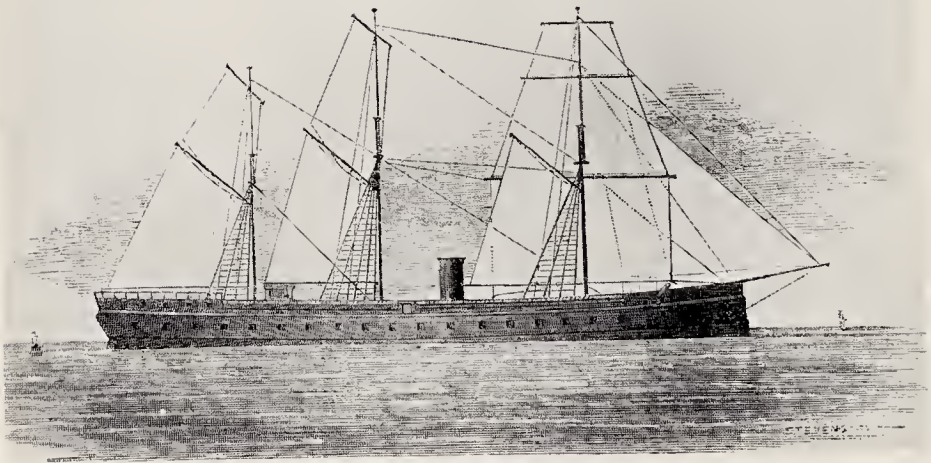
which was to be cased from end to end with iron plates $4\frac{1}{2}$ inches thick ; that she was to have ports 8 feet 6 inches apart and 5 feet or 6 feet above the water ; that she was to rely almost solely on her engines, which were expected to give a speed of 9 knots ; and that her armament would include a couple of shell-guns and thirty-four 54-pounders.

The British designers were given a free hand ; but it was stipulated that their ship should be either wholly or partially protected with iron plates of $4\frac{1}{2}$ inches, like *La Gloire* ; that a speed of 14 knots should be attained ; and that the vessel should provide ample space for her crew and be able to carry four months' provisions. The liberty which was allowed to designers, and the intense interest which was universally shown in this naval revolution, attracted the most capable and distinguished naval architects of the day, and a great number of plans were submitted for consideration. Finally the design of the Admiralty architects was accepted, and it was pointed out by a writer in the *Cornhill Magazine* at the time, that, as showing *some* of the work done for the Admiralty was not extravagantly paid for, neither the authors of the unaccepted designs nor those of the accepted plan ever received any special compensation for their anxious labours.

When the *Warrior* was completed and afloat, she realised the fullest hopes of her designers and the people who were interested in her. She was the show ship of her day, and a formidable fighting weapon. Her total cost, which was about £376,000, exclusive of guns and ordnance stores, startled and alarmed the tax-payers. It was considered huge, yet to-day we philosophically accept the expenditure of six times that sum on a single



H M.S. WARRIOR.



LA GLOIRE.

battleship. Her dimensions, too, were considered enormous. She had a length over all of 420 feet, a breadth of 58 feet, a draught of 26 feet, and a burden of 6050 tons—truly a majestic vessel for her day and generation, and a bold advance on anything in existence. Her departure from the prevailing state of things, indeed, was as notable as the beginning of the *Dreadnought* era, and we may know, from the feeling of the country with regard to that great modern naval upheaval, what the people thought of the *Warrior* fifty years ago. Probably at that time the universal interest was deeper and wider, for we were engaged in friendly rivalry with an ancient, brave, and powerful enemy, and there were still alive not a few officers and men who had helped to crush the power of Napoleon both on land and sea. When the latest *Dreadnought* came into being, France had fallen to a naval power of secondary consideration, and a new and triumphant race had entered into costly competition with Great Britain for first place in maritime dominion.

The accompanying illustrations, which are reproduced from the *Cornhill Magazine*, give an accurate, if not artistic, idea of the appearance of the *Warrior* and *La Gloire* when completed for sea. In these engravings the sail drawings, issued by the designers of the two ships, were exactly copied, with the object of securing accuracy rather than pictorial effect; the consequence being that the masts, spars, and rigging were indicated in outline only, and the sails were extended in a longitudinal plane. Despite these æsthetic drawbacks, the pictures are singularly attractive and interesting, especially as serving to show the main characteristics of the first of famous ironclads. The illustrations, naturally,

do not indictate the disposition or extent of the armour, although it will be noticed that in the case of the French ship this is pretty obvious. She was belted from stem to stern; the *Warrior* was protected only in the vital parts, and it was found that the most important of all, the region of the steering-gear, was open to the destructive effects of even a shot or shell of moderate size, and this, as Mr. Barnaby, who succeeded Mr. E. J. Reed as Chief Constructor to the Navy, pointed out, was a source of weakness for which no thickness of armour in the middle of the ship could compensate. This grave defect was remedied in the *Minotaur*, *Agincourt*, and *Northumberland*, whose steering-gear and rudder-heads were encased by armour, while the whole length of the ship, near the water-line, was protected by a metal belt, after the manner of *La Gloire*.

The *Warrior* was a triumphant refutation of the allegations that were made against her designs, and she set at nought the prophecies, numerous and gloomy, of the old salts who saw no good in her. It had been asserted that the weight of armour would drag her down or upset her; yet she actually drew nearly two feet less water than some of the existing line-of-battle ships. Despite this buoyancy, she bore on each side a belt of armour of uniform thickness— $4\frac{1}{2}$ inches—protecting the boiler-room, engine-room, magazines, shell-room, and battery—all the vital parts of the ship, excepting the steering-gear—the total length of the armour being 212 feet. Just within the limits of her armour, and 205 feet apart, were two bulkheads, which extended completely across the ship, and were almost as strongly built as her sides. These bulkheads were plated exter-

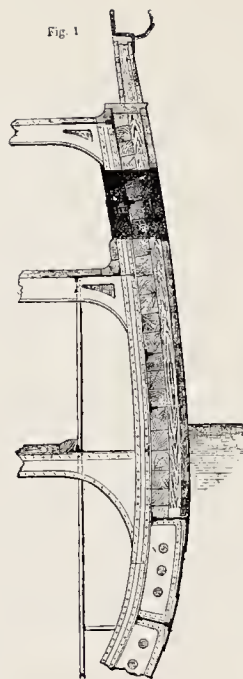


Fig. 1



Fig. 2

SECTION OF THE WARRIOR'S SIDE, AND A PORT.



South Kensington Museum.

SECTION OF ARMOUR-BELT OF H.M.S ROYAL SOVEREIGN.

nally with iron $4\frac{1}{2}$ inches thick, the plates extending 9 feet below the water-line, so as to prevent the passage of shot and shell entering the ship by way of the bow and stern. The bow and stern were exposed, but built of iron, and not timber; so that the *Warrior* throughout was an iron ship, the armour being added to the ordinary side.

One of the engravings represents a vertical transverse section of the *Warrior's* side, showing that this consisted of an ordinary but usually strong iron hull, outside of which were placed, in opposite directions, two layers of teak, one 10 inches thick and the other 8 inches. The plates were secured to the outside of this stout wall of timber, giving a thickness, irrespective of the actual shell of the vessel, of $22\frac{1}{2}$ inches. The admirers of the noble craft were justified in declaring that the *Warrior* was a fighting machine whose sides could not be penetrated by any existing gun at a distance of 200 yards, which meant that the ship was practically invulnerable.

The *Warrior's* ports were enlarged on the inside, to allow of the due training of 68-pounder guns, each weighing 5 tons, with which she was armed, these being the most powerful weapons in existence at that time. The iron plates were 3 feet broad and from 12 feet to 15 feet long, considerably larger than those of *La Gloire*, the plates having their edges fitted into each other all round, to form the whole mass as closely as possible into a single piece.

The comfort of the officers and men was one of the essential features of the designs of the architects, and the *Warrior*, like the *Dreadnought*, was in this respect a pioneer. All her drinking water and part of her provisions were carried within her armour, and every officer

was liberally provided with cabin space. In the *Dreadnought* the great change was made of placing the officers' quarters forward instead of aft, according to many generations of usage.

In speed the *Warrior* fulfilled all expectations ; but her great length and fine lines made her less handy and manageable than was desirable in a ship-of-war, and steps were at once taken to remedy these drawbacks by building shorter ships, with even greater engine-power.

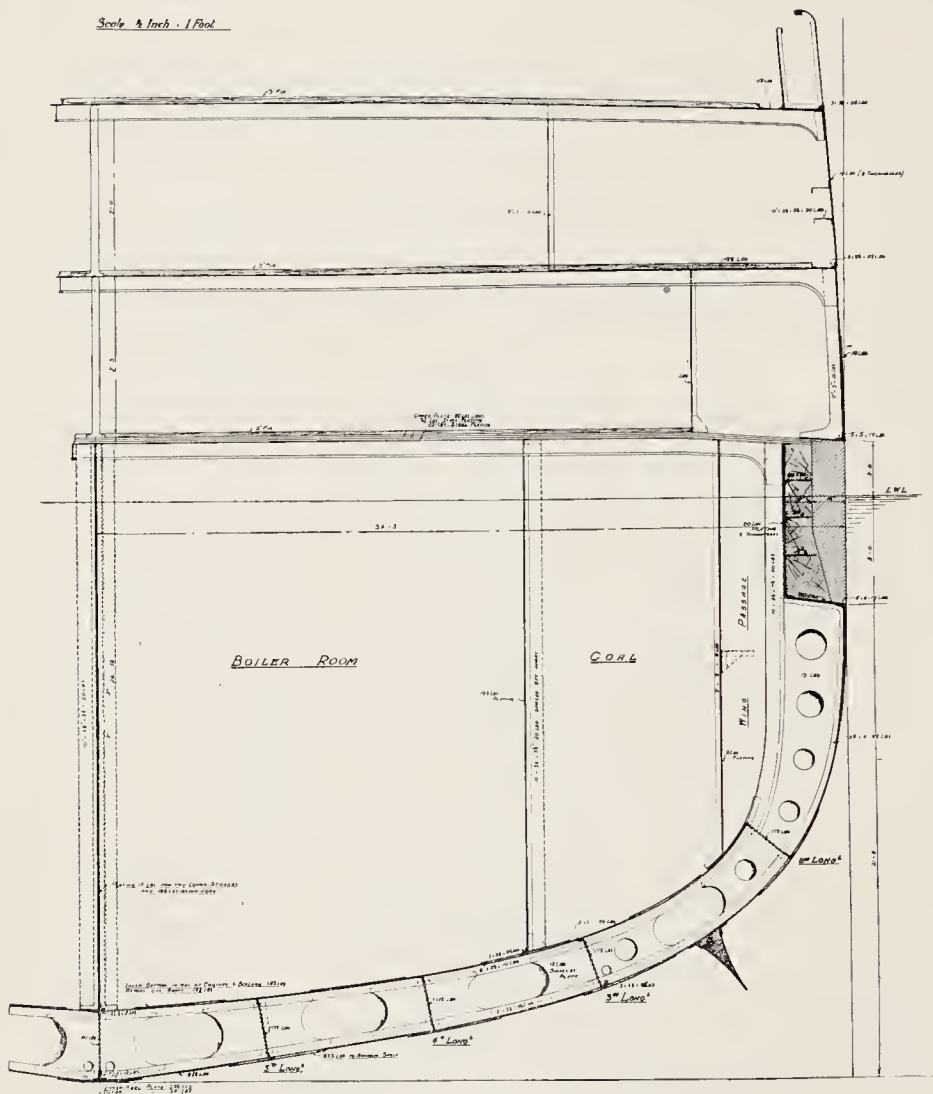
To-day there is in the British Navy another and far more formidable *Warrior*, with three sister ships. She has a length of 480 feet, a beam of $73\frac{1}{2}$ feet, a tonnage of 13,550, and with a horse-power of 23,500 attains a speed of 23 knots. The ship can carry 2000 tons of coal, and has a complement of 800. She is, however, far from being amongst the largest of our armoured cruisers, for the *Lion* and the *Princess Royal*, which come under that heading, have the immense length of 660 feet, with a beam of 88 feet, a tonnage of 26,350, and with 70,000 horse-power develop a speed of 28 knots.

The *Warrior* was built at Blackwall by the Thames Ironworks and Shipbuilding Co., Ltd., which has produced some famous vessels, amongst them H.M.S. *Benbow*. It will be interesting here, for the purposes of comparison, to give a few details of that celebrated member of the Admiral Class, because, like the *Warrior*, she was in some respects unique. The *Benbow* carried a couple of 111-ton breech-loading guns, the largest weapons ever mounted in the British Navy. By the time she was built armour had grown enormously in

MIDSHIP SECTION

H.M.S. BENBOW

Scale 1/4 Inch = 1 Foot



MIDSHIP SECTION OF H.M.S. BENBOW.

thickness, and in her case the plates were 18 inches thick. Each gun was mounted in a barbette on the upper deck. Each barbette was about 45 feet by 60 feet, and pear-shaped, in order to leave room for the loading gear. The barbettes had steel-faced armour from 12 inches to 14 inches thick. There was an ammunition-trunk plated with 12-inch armour, to protect the charge while being raised from the magazines. A wire rope raised the projectiles and the charges, which were in two portions. The projectile weighed 1800 lb. and the charge 960 lb. This mighty missile could pierce 32·5 inches of iron at a distance of 1000 yards.

The diagram of the midship section of the *Benbow* will, in comparison with the diagram of the *Warrior*, show how enormously shipbuilding for war purposes advanced at Blackwall, whose latest contribution to the Navy is the *Thunderer*.

From the time of the *Warrior* to that of the *Orion* only half a century elapsed; yet an almost inconceivable advance has been made in armour, armament, speed, and size. Fifty years ago the finest naval gun in existence, carried by the *Warrior*, was capable of penetrating 8 inches of wrought iron at 3000 yards; to-day the most powerful naval gun will penetrate 61 inches of wrought iron at the same distance. In other words, the 12-ton gun of the *Warrior* would go through $\frac{3}{4}$ ft. of wrought iron; now the 76-ton gun of the *Orion* will penetrate just over 5 feet of the same material, or 26 inches of the finest modern armour. This means that at close quarters there is no modern defence which can successfully resist the modern gun, and that the *Orion* or a ship of her class could crush and conquer any other vessel

afloat. In cost, also, there is no comparison between a modern battleship and one of the earliest ironclads. The total cost of the *Warrior* was £376,000—nearly six times the cost of a ship-of-the-line of the Trafalgar period; while it was less than a third of the cost of the 24 guns of the battleship *Hercules*, which was completed in the summer of 1911. The cost of the very latest type of battleship is about £2,500,000—a sum for which seven *Warriors* could have been built.

The steam trials of the *Orion* gave her the anticipated horse-power of 27,000 and the speed of 21 knots, this being gained during an eight-hours' full power run. For thirty hours at two-thirds power the ship made 19.5 knots, with 18,960 horse-power. The *Orion* just attained the anticipated power and speed, without largely exceeding them, as in the case of our earlier Dreadnoughts.

Even while the trials of the *Orion* were taking place, there was launched at Portsmouth, the enlarged and improved battleship of the same class, the *King George v.* She will bear the same resemblance to the *Orion* that that ship had to her predecessors, and will mark another step in advance. It was claimed for the *Orion* that she could sink any other vessel afloat without being herself damaged, and doubtless the same will be said for the *King George v.* Though no official details were published either in the case of the *Orion* or the *King George v.*, yet it is understood that while the two ships are the same in their essentials, the new battleship will be 15 feet longer than the *Orion*, and will have 6 inches more beam, with an increase in

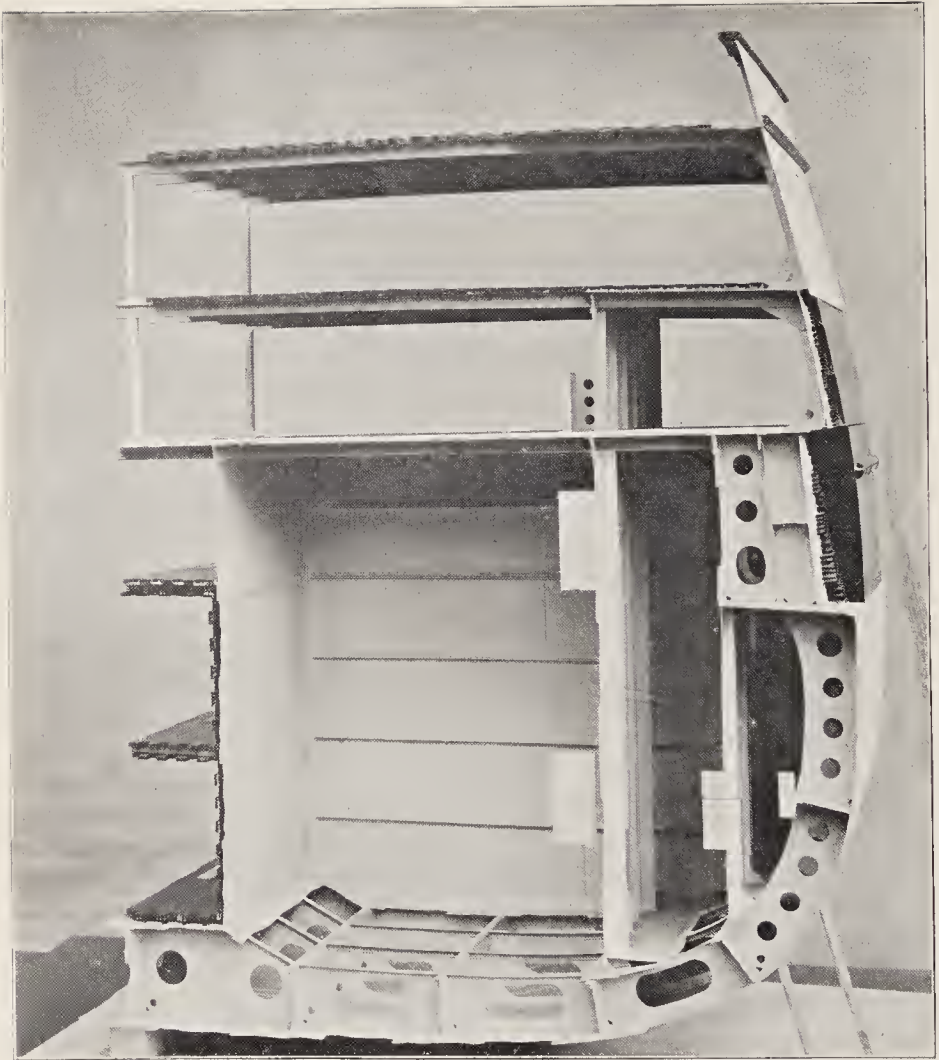
tonnage of about 1500, giving her a total tonnage when complete of about 24,000. The machinery will be of the Parsons steam turbine type, working four shafts and four propellers. Eighteen water-tube boilers will furnish steam to develop 31,000 horse-power, giving a speed of 21 knots.

The main armament of the *King George v.* will consist of ten 13·5 guns, disposed in five turrets, two in each turret. The turrets will be placed in the centre line of the ship, and, as in the case of the latest Dreadnoughts, will allow a broadside fire of all the ten big guns; and a fire of four ahead and astern, the second and fourth turrets being raised to permit the guns to fire over the first and fifth. To repel torpedo attacks the secondary armament will be the latest type of 4-inch guns, and these will be mounted under armour, an additional protection which is possible because of the increased size of the ship.

The *King George v.* will have one mast and three torpedo-tubes for firing the 21-inch torpedo. She will mark a reversion to a very old state of things in the Royal Navy—the berthing of the officers aft. In the *Dreadnought* the bold experiment of accommodating the officers forward never met with favour, and in the *King George v.* the old order of things will be restored. Not only will the officers again be berthed aft, but there will come into being, and doubtless gratefully and sympathetically welcomed, the stern-walk, which was such a pronounced and romantic and decorative feature of the old ships-of-the-line and their successors up to the *Dreadnought* era. From the time of the *Dreadnought* until that of the *King George v.* no battleships

were fitted with the stern-walk, which seemed likely, with the scrapping of the ships carrying them, to vanish from the Navy. Admirals like Rodney, Howe, Hawke, Nelson, and Collingwood planned, fretted, and resolved on the lonely stern-walks of their ships, and later admirals followed their examples in steam battleships. It is difficult to understand why the revolutionary change of officers' quarters should have been made, and harder to comprehend the motive for abolishing the stern-walk. In time of action, it is true, the stern-walk would offer a target to an enemy's guns, and the shattered framework might conceivably do mischief; but there would be little likelihood of such a calamity—and the ingenuity of the modern naval constructor would be equal to overcoming such a drawback by going even so far as to invent a collapsible and shippable stern-walk. There is no need for such a call on the inventive faculties, and it is enough that the stern-walk has been restored, and that officers have reverted to their former place.

For a considerable period the French battleships formed a class which was unique in modern ships of war, because of the great prominence which was given to their rams and their fighting-tops. Both of these features, according to many modern ideas, were greatly exaggerated, for the ram attained a length of about forty feet, and the fighting-tops in fine vessels like the *Masséna* were immense structures fitted to enormous masts. There were, fortunately, no actual means of proving the efficacy or otherwise of either the tops or the rams. They came into being, they passed through a long period of friendly and hostile criticism, and they vanished from the French



South Kensington Museum.

HALF MIDSHIP SECTION OF H.M.S. ROYAL SOVEREIGN.

Navy, becoming, like many of our fine battleships, scraps of metal.

The French Navy was allowed to deteriorate, and it seemed as if the ancient and splendid sea reputation of that great fighting nation would be permitted to die; but reaction came, and the French Navy entered upon a new period of advance. In some ways France had profited by her apparent indifference and neglect, for she was able to begin when other countries had been experimentally building—Great Britain producing her *Dreadnought*, Germany her *Von der Tann*, and America her lattice-masted ships, and when, generally, the “all-big-gun” system had been adopted.

In February 1910 there was begun a great new programme, under which it was proposed that in nine years France should have twenty-eight battleships. To provide that programme, it was necessary to build fifteen new ships, so that by the year 1919 only the dozen vessels of the *Danton* and *Patrie* classes, with the *Suffren*, would be left on the effective list. In the autumn of 1911 the first battleship, of 23,500 tons, bearing the famous name of *Jean Bart*, was launched at Brest. She had been laid down only ten months previously, and her completion is being continued as rapidly as possible. Her engines are to develop 28,000 horse-power and her designed speed is 20 knots. Her complement will be 34 officers and 1050 men. It is expected that her total cost when she is ready for sea will be £2,500,000, an enormous increase over that of any other battleship which was ever built for the French Navy. According to the best French ideas, she will be equal to any battleship afloat.

France's latest battleships have uncommon features,

and the most marked of these was noticeable at the Coronation Review of 1911, for one of the conspicuous ships present was the *Danton*, whose five funnels made her more readily recognisable to the ordinary eye than any other unit at Spithead.

CHAPTER XIII

GUNS, RAM, AND ARMOUR

THE greatest naval gun to-day nearly equals in length that of one of the earliest battleships in the Royal Navy, and the cost of constructing such a weapon exceeds the price which was formerly paid for an efficient fighting ship, ready to meet an enemy.

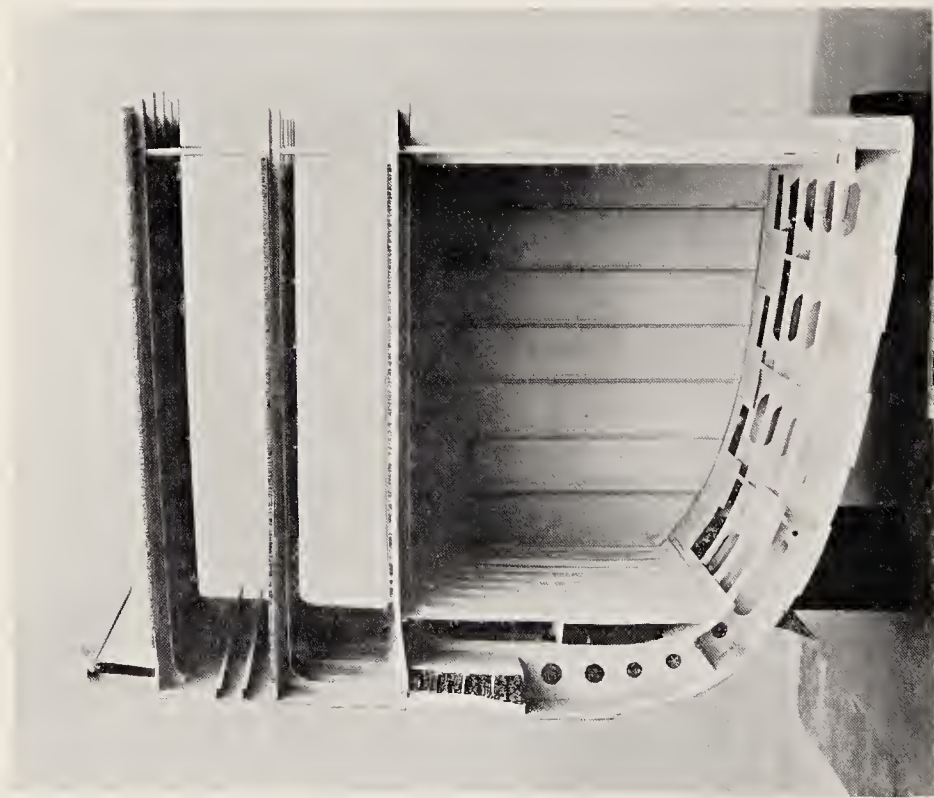
The development of ordnance has kept pace with that of the fighting ship, yet the breech-loading system, which gave to the modern gun so much of its increased efficiency, was in use in some of the first of British battleships, for it was employed in the weapons of the *Mary Rose*, and the principle had been known, even at that time, for many centuries. A genius was needed to extend the principle and pave the way for the introduction of ordnance which is on precisely the same mammoth and costly scale as that of the greatest modern battleship. The life of a battleship is limited, not by years or wear and tear, but by discovery and expediency, and the existence of a modern gun is determined in the same fashion, though it is possible for the weapon to be worn to the point of condemnation by actual hard usage.

The fight for gun supremacy is ceaseless. As soon as the power of a new weapon is known, steps are taken by inventors to create ordnance which shall surpass it in

every way ; consequently it happens that many powerful guns pass into and out of navies without ever being put to the supreme test of action. Battle has shown something of the terrible powers of ordnance and torpedoes, also something of the efficiency of steam and the protection of armour ; but there has been no modern fight to give more than problematical results, for combatants have not been well matched. It remains for a general engagement between two great Powers to prove fully what is the actual worth of modern naval artillery and the mammoth modern battleship, whose chief energy is her gun.

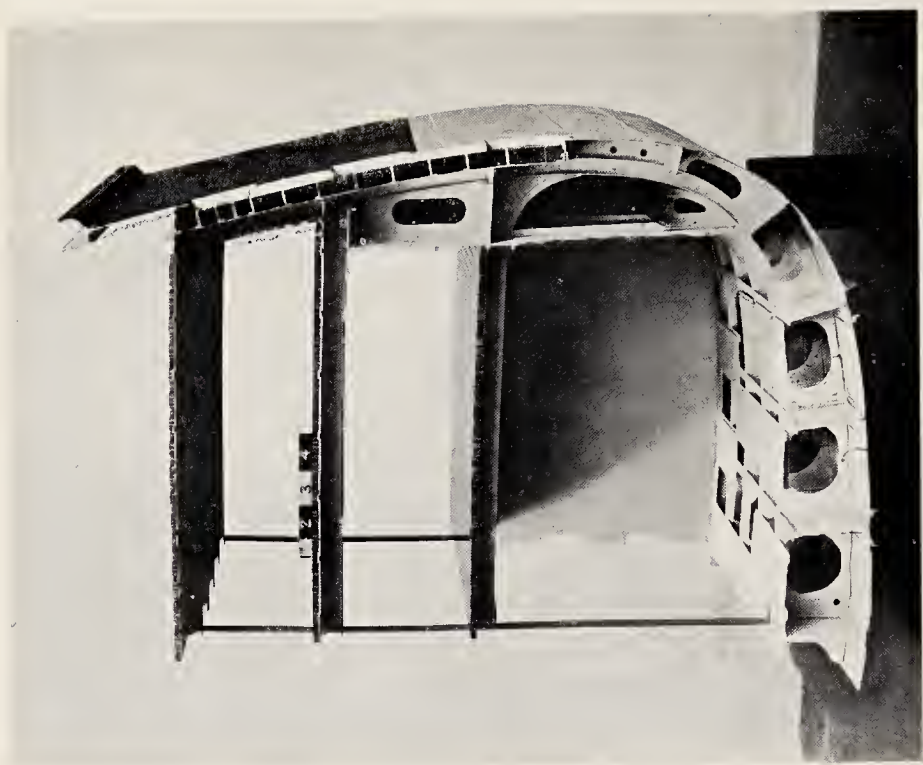
The 13·5-inch gun had been scarcely mounted in British ships when the announcement was made that the American Navy Department, under the direction of Rear-Admiral Twining, had designed a 16-inch gun to throw a projectile weighing 2000 lb., with armour-piercing velocity, a distance of fifteen miles. The gun will be 67 feet long, and, so that it may be used, a new type of " Dreadnought " will be needed, for no battleship now in commission in any navy could successfully resist the firing of the new weapon. The largest gun at present in use is a 14-inch weapon, firing a projectile of 1400 lb. eleven miles, and these are fitted to the latest United States battleships.

The half-century that passed between the advent of the *Warrior* and the appearance of the *Orion* was a period of incessant combat between gun and armour, and of rivalry amongst naval constructors. First one system was brought into being, then another, until even naval officers themselves were unable fully to realise what was happening, the more so as the creation of ships was largely



South Kensington Museum.

HALF MIDSHIP SECTION OF BATTLESHIP OF H. M. S. COLLINGWOOD CLASS.



South Kensington Museum.

HALF MIDSHIP SECTION OF H. M. S. BELLEROPHON, 1865.

a matter of theory and experiment, a task for accomplishment by highly skilled and clever designers, and not solely a question of proceeding according to outstanding lessons taught by the bitter and costly experience of war. With wooden ships-of-the-line there was little or no difficulty, for centuries of practice had established a basis of construction, and the exact performances of sailing ships built of timber, in all circumstances of peace and war, were known. Not so with metal and armoured vessels, although the value of iron and the resisting power of armour had been fully proved.

A far-reaching change in the design of warships was made in 1863, when Mr. E. J. Reed had become Chief Constructor to the Navy. Guns had increased rapidly in size and penetrative power, and it was considered best to mount the ordnance in shorter and handier ships which should be provided with a double bottom, and carry a smaller number of the heaviest existing weapons in a short central battery built above the ordinary water-line armour, the latter extending from stem to stern. The whole of these principles were embodied in the *Bellerophon*, which was laid down at Chatham in 1863 and completed for sea three years later. She had a length of 300 feet—80 feet shorter than the *Warrior*—and a breadth of 56 feet. Constructed of iron, she was an advance on all preceding ships-of-war, amongst her improvements being a complete cellular double bottom for two-thirds of the length amidships—a feature which has been so much improved and extended that the battleship of to-day is practically two ships, one within the other. The *Bellerophon* had a displacement of 7550 tons, and her engines of 6500 indicated horse-power gave her

a speed of 14 knots. She carried ten 12-ton guns, capable of piercing 10 inches of armour at 1000 yards. The calibre of this weapon was 9 inches and the weight of the shell 253 lb., with a muzzle energy of 3695 foot-tons, compared with the 13·5 calibre of the 76-ton gun, a weight of shell of 1250 lb., and a muzzle-energy of about 70,000 foot-tons. Those were the days of muzzle-loading ordnance.

Breech-loading guns were introduced into the Navy with the *Edinburgh*, *Colossus*, and *Conqueror*, which were launched in 1881-82. The *Colossus* was the first steel ship to be laid down at Portsmouth, the famous *Inflexible*, which she resembled, being entirely constructed of iron. The muzzle-loading guns of the *Inflexible* were nine times as heavy as the guns of the *Warrior*. The first big breech-loading gun was mounted in the *Hero* and *Collingwood*, as well as in the *Colossus*, *Conqueror*, and *Edinburgh*. It was a 43-ton weapon, with a calibre of 12 inches, and fired a shell of 714 lb., which penetrated wrought iron to the extent of 18·8 inches at 2000 yards. A still larger and more powerful gun was fitted in the *Anson*, *Howe*, *Rodney*, and *Camperdown*, this being the famous 67-ton gun, of 13·5 calibre, capable of penetrating 27·6 inches wrought iron at 2000 yards. The still more celebrated 111-ton gun was on trial with the 13·5 and the 12-inch weapon. The *Majestic* carried this 12-inch weapon, which for sixteen years maintained its position and was being constantly improved. The *Majestic* was completed in 1894, at which time the weapon weighed 46 tons and had a charge weighing 167 lb.; but by 1910, when the "Dreadnought" class had been fitted with the latest type of 12-inch ordnance, the weight

had risen to 66 tons and that of the charge to 344 lb., while the muzzle energy had increased from 33,020 foot-tons to 53,400 foot-tons.

On 15th June 1866 the *Royal Sovereign* was subjected to heavy gun fire from the *Bellerophon*, with the object of testing the vulnerability of her turret and the immunity of that structure from damage under bombardment. The shots were fired from an Armstrong 12½-ton gun at a distance of 200 yards, the projectiles weighing 246 lb. and 250 lb. The experiment proved the invulnerability of the turret to the fire directed against the armour. The firing, which took place off St. Helens, Isle of Wight, was watched by the Board of Admiralty and a large crowd of onlookers from yachts and excursion steamers.

“All-big-gun” sums up the principle of the modern mammoth battleship, which has become in reality a gigantic platform capable of supporting an immense weight of ordnance, and of withstanding the shock of a terrific and almost incredible discharge of artillery. With an enormous length such as that which has now been reached, especially in the battleship cruisers, and the vast breadth of a modern mammoth, whose beam is but little short of 100 feet, there is plenty of room for the disposition of even very large guns; but even that great area was considered insufficient by the disciples of the “all-big-gun” gospel. The foundation of that new faith is to pound heavily and rapidly, and to direct upon a given object the greatest aggregate of force. It happened, consequently, that there was brought into being the system of superimposed turrets, in other words, placing the big guns in two storeys, and it may

be that in the near future this system will be carried to an even greater extent than at present. America is already talking of three turrets, one above the other.

Side by side with this extension of the turret principle came the innovation of bringing to bear simultaneously the whole of the big guns of a battleship. What this meant was sufficiently indicated even by the meagre details which transpired as to the gunnery tests of the *Orion*. When her full broadside was discharged, the concussion was so tremendous that buildings were shaken and windows shattered a dozen miles away; and it was declared that the noise of the explosions was heard at a distance of forty miles. There is in such experiments considerable risk to the officers and men who take part in them, and special precautions were adopted to protect the ship's company, particularly so far as their hearing was concerned. The trials passed off successfully and safely, for no casualties were reported, and accidents, of course, would have been inevitably made public. In this connection it is worth noting that during very recent years the Admiralty precautions relating to secrecy of construction and experiments have become, and rightly so, exceedingly stringent. It was common enough, a few years ago, to see photographs published showing details of battleship construction and gunnery and other trials; but these are no longer available, for the Admiralty refuses to give permission for photographs of battleships in royal dockyards to be taken; more than that, when a battleship leaves the hands of private contractors and comes under direct authority, photographs may not be

taken without official permission, and that is not readily given. There is, however, little chance of successfully and completely evading the attention of the Press photographer. If he sets his heart on securing a record of a certain thing the chances are that he will succeed. His task must be at times unpleasant, therefore it is all the more to his credit that he triumphs. Great secrecy was maintained with regard to the hoisting on board the *Thunderer* of the much-talked-of 13·5-inch guns, yet the very day they were craned on board they were photographed by an enterprising camera-man, and on the following day excellent pictures were reproduced in a London daily illustrated newspaper.

Although there has not been any general engagement to show what the very latest guns and torpedoes would do in action, still there are examples of the terrible power of modern explosives. Ships are built with a double bottom, they are further protected by being divided into a great number of watertight compartments, but with any serious explosion under water or in a magazine there is no chance whatever for a modern battleship. This has been proved quite recently in the case of the French battleship, the *Liberté*, and a few years previously in the case of the American battleship *Maine*. Both were noble examples of ship-building, yet in a few moments they were shattered and reduced to almost shapeless masses as completely as if they had been structures of the flimsiest nature. It has been suggested that the bottoms of ships might be armoured as well as the sides, but apart from the obvious impracticability of constructing such a vessel

with sufficient power to float and be of service, it is almost certain that no armour could withstand the terrific force of such modern explosives as are used in submarine mines and torpedoes; certainly none could resist the ram of a Dreadnought, with the momentum of such a mammoth battleship behind it.

During the war between Chili and Peru, in 1879, the Peruvian ship *Huascar* rammed and sank her opponent, the *Esmeralda*, a wooden corvette. The occurrence attracted much notice at the time, more because of the savage ferocity of the combatants than the actual destruction caused by the ram, especially in the case of a wooden ship. Far greater interest was shown in the loss of the *Vanguard*. She was struck by her consort, the *Iron Duke*, in the Irish Channel. Another case of the power of the ram was that of the loss of the *Grosser Kurfürst*. On the morning of 31st May 1878, this ship, while off Sandgate, collided with the bow of the *König Wilhelm*. The *Grosser Kurfürst* was struck on the side, and a remarkable thing happened in connection with her armour, which was ripped, "like the skin of an orange," from the point where she was struck to the stern. At that time armour plating was not secured with the enormous strength and completeness of the fastenings of to-day, yet no doubt modern armour would be stripped just as easily if an oblique blow were struck.

The most terrible of all examples of the power of the ram, however, was afforded by the case of the *Victoria* and the *Camperdown*. These two ships, the finest of their class in the world, were off the coast of Syria on 23rd June 1893. During manœuvres in perfectly



From the model at South Kensington Museum.

H.M.S. VICTORIA.



H.M.S. SANS PAREIL, SISTER SHIP TO H.M.S. VICTORIA

calm weather, the *Victoria*, owing to an error of judgment on the part of the commander-in-chief, Vice-Admiral Tryon, in issuing an impossible order, was struck by the ram of the *Camperdown*. So terrific was the impact that the *Victoria* sank in a few minutes, carrying with her the admiral and 22 officers and 350 men, the *Camperdown* herself being seriously damaged.

The battle of the Yalu River, during the war between China and Japan in 1894-95, gave some instructive lessons as to the effects of modern shell fire and the resistance of modern armour. Generally speaking, the shell was disastrous. Ship after ship was set on fire, there were devastating explosions and a sacrifice of life which was appalling, though not so heavy as that which was caused by many a raking broadside in the days of sail. The Chinese battleships *Chen Yuen* and the *Ping Yuen*, each of which carried six heavy guns and were armoured, were the chief units in the Chinese squadron. The opposing Japanese squadron consisted mostly of cruisers. The Japanese flagship was the *Matsushima*, and she was a vessel of only about 4300 tons, carrying one 12·5 gun and eleven 4·7 inch quick-firing guns.

For several hours the *Matsushima* and the *Ping Yuen* fought fiercely, both ships being severely damaged. The *Ping Yuen's* big gun having been put out of action, the *Chen Yuen* was attacked by the *Matsushima*.

Now happened one of the most dreadful incidents of the engagement, and proof was given of the destructive effects of the bursting on board ship of a single modern high explosive shell. A heavy shell from the Chinese

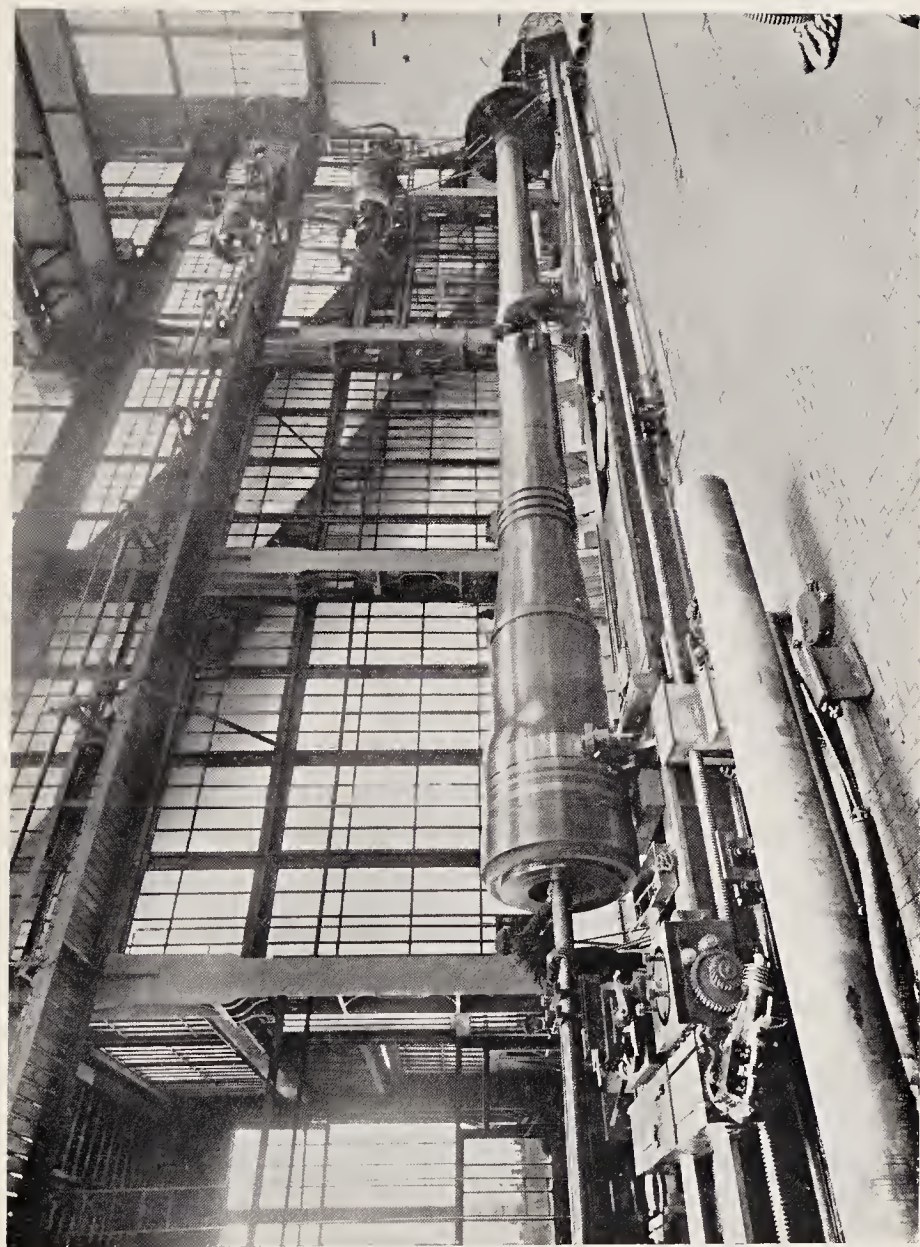
battleship burst on board the Japanese flagship, putting out of action the 12·5-inch gun and a 4·7 gun, and exploding a great amount of ammunition in the battery. The total number of men killed or wounded by this shell was more than fifty. In addition to the havoc wrought in the battery, the ship was set on fire, and indeed was so hopelessly crippled that the admiral shifted his flag to the *Hashidate*. On the Chinese side, the *Chen Yuen*, after a valiant defence, was struck on the water-line by a shell which made an enormous rent. Through this opening the sea poured in such immense quantities that the ship very speedily sank and all on board perished.

The *Chen Yuen* had Captain M'Giffen, a Scotsman, in command. She was set on fire eight times, and was only saved from destruction by the skill and courage of her captain and his officers.

The *Ping Yuen* was set on fire by a shell and made helpless owing to her steering-gear being damaged. In her case also she was badly ripped in the hull. She turned turtle and with a loud explosion went down, taking with her 263 men out of 270 on board.

One of the most important lessons learnt from this famous battle of the Yalu was that so far as the danger of fire was concerned there had been little or no change since the days of wooden ships. Even twenty years ago great quantities of inflammable material were used in constructing warships, and though this material was naturally not present to such an extent as in earlier days, still there had been an enormous advance in the destructive power of shells.

Advantage was taken of the lessons of the Japanese



Sir W. G. Armstrong, Whitworth & Co., Ltd

FINISHING THE BORE OF A 12-INCH GUN.

war, and later of the Spanish-American and Russo-Japanese wars, and all possible improvements based on the experiences of the naval part of those campaigns have been embodied in the latest battleships. Inflammable material is employed as sparingly as possible, and whenever wood is used it is prepared so as to make it non-inflammable.

One of the most appalling disasters to modern battleships was the explosion of the *Maine* at Havana on 15th February 1898. The *Maine* was a twin-screw second-class battleship of 6650 tons, and was the largest vessel built up to that time in any of the American navy yards. Her keel was laid on 17th October 1888, and her hull was launched on 18th November 1890. She was commissioned on 17th September 1895, and left the Navy Yard, New York, on 5th November 1895, drawing 22 feet 1 inch forward and 21 feet 8 inches aft. She was divided into 214 watertight compartments.

Apart from the shocking nature of the catastrophe itself, the incident made war between the United States and Spain inevitable. During the previous three years no United States vessel had visited Havana, and in the mind of Captain Charles D. Sigsbee, who commanded her, there was much doubt as to the nature of his reception, owing to the state of feeling between the two countries. "I was sincerely desirous of a friendly reception," he wrote in his personal narrative of the loss of the *Maine*; "but it was my affair to be ready for all emergencies. The *Maine* was in such a state of preparation that she could not have been taken at much disadvantage. . . . On board United States men-of-war

it is commonly only a short step from peaceful appearance to complete readiness."

The *Maine* was moored to a mooring-buoy chosen by the pilot, and every precaution was taken against injury or treachery. There were sentries on the fore-castle and poop, quartermaster and signal-boy on the bridge, and a second signal-boy on the poop. The corporal of the guard was specially instructed as to the port gangway, and the officer of the deck and the quartermaster as to the starboard gangway. A quarter-watch was kept on the deck at night instead of the usual anchor-watch; the sentries were supplied with ammunition—rapid-fire ammunition and 6-inch shells were available; steam was kept up in two boilers instead of one, to be more completely ready to work the hydraulic mechanism of the turrets. Visitors were carefully watched, the officer commanding the marine guard was ordered to make at least two visits during the night to various parts of the ship, and generally Captain Sigsbee considered the *Maine* to be in a position that demanded extreme vigilance and a well-sustained routine both by night and day. "I did not expect to be blown up, either from interior or exterior causes, although precautions were taken in both directions. Nevertheless I believed that she could be blown up from the outside, provided a sufficient number of persons of evil disposition and with the conveniences at hand were free to conspire for the purpose. . . . I believe that the primary cause of the destruction of the *Maine* was an explosion under the bottom of the ship, as reported by the Court of Inquiry."

The *Maine*, on the night of the explosion, was lying in the position in which she would have been sprung



Messrs. Vickers, Sons & Maxim, Ltd.

PLANING-SHOP FOR ARMOUR-PLATES.



Messrs. Vickers, Sons & Maxim, Ltd.

ARMOUR-PLATE ROLLING MILL.

to open her batteries on the shore fortifications. If an expert had been charged with mining the *Maine's* mooring-berth, purely as a measure of harbour defence, and having only one mine available, it is believed that he would have placed it under the position that the *Maine* occupied that night. The weather was unusually hot and sultry, the atmosphere was heavy, and the night was dark and overcast. With the exception of four, all the twenty-six officers were aboard; the members of the crew, numbering 328, were on board and were turned in, except those on watch; some of the officers were in their state-rooms or in the mess-rooms; others were on the main or upper deck, or in or about the officers' smoking quarters, which were abaft the after-turret on the port side, abreast the after-superstructure. One of the steam launches was afloat, riding at the starboard boom.

Captain Sigsbee was in his quarters, sitting in the port or admiral's cabin, the *Maine* being arranged to accommodate both an admiral and a captain. He was busy writing, and had put down his pen to listen to the marine bugler sounding "Turn in and keep quiet," the notes sounding marvellously clear in the oppressive stillness of the night and making a wonderful echo. That was at ten minutes past nine o'clock.

Captain Sigsbee was putting a letter in an envelope when the explosion came. "To me, in my position well aft, and within the superstructure, it was a bursting, rending, and crashing sound or roar of immense volume, largely metallic in character. It was followed by a succession of heavy, ominous, metallic sounds, probably caused by the overturning of the central superstructure and by falling débris. There was a trembling and

lurching motion of the vessel, a list to port, and a movement of subsidence. The electric lights, of which there were eight in the cabin where I was sitting, went out. Then there was intense blackness and smoke.

"The situation could not be mistaken. The *Maine* was blown up and sinking . . . I knew that the *Maine* had been blown up, and believed that she had been blown up from the outside."

The number of the killed and drowned was two officers and two hundred and fifty men; one hundred and two people were saved; but of these, eight died at Havana. The total number of lost was two hundred and sixty.

Terrible scenes followed the explosion and before the *Maine* sank, but there is reason to believe that most of the dead were killed outright, and many of the survivors declared that they knew nothing of the affair until they awoke and found themselves in a strange place.

A disaster which was quite as dreadful as that of the *Maine* was the loss of the first-class French battleship *Liberté* in Toulon Harbour on 25th September 1911. The *Liberté* was a ship of 14,640 tons and 18,000 horse-power, with a designed speed of 18 knots, and was launched in 1906 and completed in 1908. Her main armour was 11 inches and her principal armament four 12-inch guns. Her total cost was £1,652,436. The ship's complement was 739; but at the time of her destruction a considerable number of the officers and men were ashore. At six o'clock in the morning there was an explosion so tremendous that the sound of it was heard thirty miles away. When the immense clouds

of smoke had cleared away there was nothing to be seen of the fine battleship except an enormous scrap-heap. The surrounding water was covered with floating débris and shattered human remains. Three sister ships and another warship, all of which were at anchor, were severely damaged by the explosion. A mass of armour which weighed nearly a ton was wrenched from the belt of the *Liberté* and hurled against the side of the battleship *République* with such immense force, that some of her plates were ripped off or stove in for a distance of 20 feet or 30 feet. This huge projectile killed several men in the *République*, on the deck of which there was also hurled the fore-bridge of the *Liberté* as well as great quantities of other destructive débris.

A bugler of the *Liberté*, who had sounded the alarm, was blown on board the *République*. He was dead when found, and his hand still clasped the bugle whose wild notes had been so dramatically silenced.

Two miles away a warship was anchored. Her captain was on the bridge, watching the explosion, when a fragment of shell struck and killed him. The number of officers and men killed on board the *Liberté* and the other ships was more than two hundred.

The cause of the disaster was ascribed to spontaneous combustion of some defective powder—which was supposed to have also caused the explosion in the French battleship *Jéna* at Toulon on 12th March 1907—although it was stated that fire broke out and reached one of the magazines. The disaster showed once more how appalling are the results of an explosion of modern powder, and how utterly helpless is even the most powerful and perfect ship to withstand the force of

such a happening. Almost in a moment the splendid *Liberté* was a shattered and unrecognisable mass of steel, a mammoth scrap-heap rising from the water of the harbour, on the bed of which she rested, twisted and distorted beyond recognition.

Nothing gives a clearer understanding of the might and power of present-day projectiles than such an illustration as that which is given of three armour-piercing projectiles made by Hadfield's Steel Foundry Co., Ltd., Sheffield. The gigantic dimensions of modern missiles are indicated by comparison with the figure of a man who is standing by one of them; and the amazing hardness of the shot and shell is proved by the conditions shown after experiments against armour-plate of the most recent description.

The first projectile represents one of the Hadfield "Heclon" armour-piercing projectiles, 12-inch calibre, weighing 860 lb., equipped with their new patent cap, which was recently fired against a 12-inch Krupp Cemented plate at under 1700 foot-seconds, equivalent to a range of about $6\frac{1}{4}$ miles. The projectile perforated the 12-inch plate, the skin plate, backing, and target, and was recovered unbroken at a distance of more than two miles beyond the target.

The second projectile represents a Hadfield 14-inch "Eron" shell of large bursting capacity, after perforating, unbroken, a 6-inch Krupp Cemented plate of the latest type. The projectile was fired at the low velocity of 1120 foot-seconds, and passed through the plate, the backing, and 24 feet of sand-butt, and was recovered unbroken about a quarter of a mile beyond the butt.

The third projectile is a 14-inch "Heclon" armour-



HADFIELD'S ARMOUR-PIERCING PROJECTILES.

piercing shot (capped), after perforating unbroken a 12-inch Krupp Cemented plate of the latest type. The velocity in this case was 1497 foot-seconds, and the projectile passed through the 12-inch plate and no less than 20 feet of sand-butt. On this point Messrs. Hadfield say that "No other 12-inch K.C. plate has yet been perforated at this extraordinary low velocity, which is equivalent to a range of no less than $7\frac{1}{2}$ miles, that is, a 12-inch K.C. plate would have been perforated by this Hadfield projectile from a gun placed $7\frac{1}{2}$ miles away."

Modern works and machinery have grown in proportion to present-day requirements, with the result that there have come into being enormous private undertakings which were unthought of not many years ago, and principally because of the dominion of the battleship. In Germany there is the gigantic firm of Krupp; France, America, and other countries have their great private concerns; but there is no nation which is more favourably circumstanced in this respect than Great Britain. An inland city like Sheffield is as closely associated with the Navy of to-day as were the old royal dockyards with the fleet of oak; but a private firm will now employ far larger numbers of men than were occupied in an old-time dockyard. Messrs. Hadfield, for example, employ 5000 people.

CHAPTER XIV

PROPELLING MACHINERY

THERE is as much difference between the method of steam propulsion in the most recent battleship and that of the earliest system as there is in the latest mammoth compared with the old ship-of-the-line. During the transition period virulent hostility was shown to the employment of steam in any shape. The old school of seamen had no faith in anything but sail and wind and timber, and they prided themselves on their ability to handle a ship under any conditions. There were some amazing achievements in the days of the ship-of-the-line ; but the earliest experiments with steam conclusively showed that even the most skilful seamanship and the finest sailing craft could not hold the field. There was complete dependence on wind and weather, and in certain circumstances sure destruction.

The history of the ship-of-the-line is a continuous record of marvellous accomplishment, almost incredible human endurance, and incessant disaster. Every year paid tribute in the loss of ships and men because of inability to avoid a leeshore or to handle a battleship effectively in dangerous weather. The old *Victory* would doubtless have survived even that great gale in which she was lost in 1744 with 1100 men, if she had been able with the help of steam to keep to the open sea,

and there would not have been those appalling losses which a hundred years ago stunned and horrified the people of Great Britain. At Christmas time, in 1811, the *Hero*, 74 guns, the *Defence*, 74, and the *St. George*, 98 guns, were lost on the coast of Jutland, and only eighteen men were saved out of a total number of two thousand. The *Hero* carried 590 officers and men, of whom every one perished. A year previously the *Minotaur*, 74 guns, was lost with 400 men. The terrible gale of 1703, made memorable by Defoe's description of it, caused a loss in the Downs alone of thirty men-of-war.

The engines and paddles which were introduced experimentally into small vessels of the Navy when the advantages of steam had been fully proved in merchant ships, were not able to beat the records of the finest ships-of-the-line, some of which were remarkably fast; but the superiority of steam over sail was shown repeatedly. In the earliest stages of steam propulsion paddle craft were employed to tow ships-of-the-line, and it was intended that this should be done at the bombardment of Acre in 1840.

The first war steamer in the world was built in America nearly a century ago by Robert Fulton. In 1813, he showed to the President of the United States a drawing of a proposed war steamer or floating battery which he called the *Demologos*. He claimed that the vessel would be capable of carrying a strong battery, with furnaces for red-hot shot, and would be propelled by steam at what sounded like the incredible rate of four miles an hour. The original intention was to create a vessel which should put to nought, as a weapon of

offence, anything that the world contained. In addition to her deck battery, the *Demologos* was to have submarine guns, two suspended from each bow, in order to fire a 100-lb. ball into an enemy's ship at a distance of 10 or 12 feet below the water-line. There was also to be an engine which would discharge an enormous column of water upon the decks and through the port-holes of an enemy. The vessel was to cost 320,000 dollars (£64,000).

The project appealed to the Executive, and in March 1814 the President was by law empowered to order the construction of one or more floating batteries for the defence of home waters. Fulton was appointed the engineer. On 20th June the keel was laid at the yard of Adam and Noah Brown, New York, and so earnestly was the work done that the craft was launched on 29th October following, her construction having covered a period of only a little more than four months. The vessel at once became known as *Fulton the First*. Her advent was greeted with tumultuous applause by hosts of spectators afloat and ashore, and people marvelled at her enormous bulk and apparent unwieldiness. For the day indeed her dimensions were astonishing. These were—

	Feet.
Length	156
Breadth	56
Depth	20
Diameter of water-wheel	16
Length of bucket	14
Dip	4
Engine, 48-inch cylinder, 8 feet stroke	
Boiler, length, 22 feet; breadth, 12 feet; depth, 8 feet	
Tonnage	2475

The wooden walls were 5 feet thick, diminishing to below the water-line; the gun-deck was 140 feet long and 24 feet wide, and mounted 20 guns. The water-wheel, or paddle, was in the centre of the ship; the boiler and machinery were well protected and almost below the water-line.

The engines were put on board by June 1815, at the time when Waterloo was fought, and the battery left the wharf near Brooklyn Ferry and steamed "majestically" into the river, sailing proudly by the forts and saluting them with the 32-pounders. "She exhibited a novel and sublime spectacle to an admiring people"; and she was a complete success. On 4th July, famous and appropriate day—the anniversary of American Independence—the battery made a trip to and from the open sea, covering the distance of 53 miles in eight hours and twenty minutes, without the help of sails. In September, with her whole armament on board, she made another passage to the ocean, keeping up an average speed of five and a half miles, with and against the tide. She steamed against a three-mile tide at the rate of two and a half miles an hour. Altogether the ship exceeded the utmost expectations of the Government, though Fulton had been confident of complete success.

The *Demologos* was the *Dreadnought* of her generation, and she filled the naval experts of other nations with a distrust amounting to panic. One writer, in a work published in Scotland, claiming that he was giving full and accurate details of the new invention, wildly distorted the real circumstances. He gave her a length of nearly double the actual dimensions; he quadrupled her beam, which he said was 200 feet; declared that her

sides were 13 feet thick, and consisted of alternate oak plank and cork wood; and vowed that she carried 44 guns, of which four were 100-pounders. But the author had only gently paved the way for his prime horrors. Further to annoy an enemy attempting to board, he said, she "can discharge one hundred gallons of boiling water in a minute, and by mechanism brandishes three hundred cutlasses with the utmost regularity over her gunwales; works also an equal number of heavy iron pikes of great length, darting them from her sides with prodigious force, and withdrawing them every quarter of a minute." This is the kind of vision we get in dreams, but do not expect to read in the works of sober and reflecting writers like Scotchmen. It is difficult to know where this particular author could have gleaned his details, unless it was from his imagination.

There was no opportunity of showing what the *Fulton the First* could do on actual service, for the war ended before she was quite completed, and she was taken to the Navy Yard at Brooklyn, where she remained till June 1829. Then, fourteen years after she was built, she departed in a manner that justified her terrible reputation in North Britain. She was blown up on the afternoon of 4th June, and 24 men and women were killed, 19 were wounded, and 5 were missing. Commodore Chauncey, who was at the time Commandant of the New York Navy Yard, reported that he had been on board the vessel all the morning inspecting the ship and men, particularly the sick and invalids, who had increased considerably from other ships. He left the *Fulton* only a few minutes before the explosion took place. The report was not louder than

a 32-pounder, but the destruction of the vessel was complete, owing to her very decayed state, for there were not on board at the time more than two and a half barrels of damaged powder, which was kept in a magazine for the purpose of firing the morning and evening gun. "It appears to me," he added, "that the explosion could not have taken place from accident, as the magazine was as well, or better, secured than the magazines of most of our ships; yet it would be difficult to assign a motive to those in the magazine for so horrible an act as voluntarily to destroy themselves and those on board. If the explosion was not the effect of design, I am at a loss to account for the catastrophe." It is possible, of course, as modern experience has shown, that the disaster was due to spontaneous combustion of powder.

Americans were naturally proud of the fact that they had so successfully produced the first steam warship, and something may be allowed to the spirit which prompted the expression of their exultation. The *Fulton* had been constructed under the most disadvantageous conditions; yet she had been carried safely through all her tribulations, largely owing to the unconquerable spirit of Fulton, that "most ingenious and enterprising citizen," as he was called by the Commissioners who superintended the building of the vessel on behalf of the United States Navy. He who had succeeded in his project for moving boats containing travellers and baggage by that "elastic agent," steam, opened the way to its employment "for carrying warriors and the apparatus for fighting." What would Fulton, Watt, and Stephenson think to-day if they could witness the gigantic achievements of the "elastic agent"?

When the *Fulton* was being built, Great Britain and the United States were at war, and the enormous coastline of America was exposed to descents, often made, by British ships-of-war. The most rigid blockade crippled the coasting trade and increased the price of timber, of which large quantities were needed for such a ship as this new battery. The importation of the necessary copper, lead, coal, and other materials was greatly hampered. With respect to the actual labour also there were many obstacles to overcome. Shipwrights had been very much reduced in number, and ordinary workmen had enlisted as soldiers; yet the task of building the *Fulton* went on until she was triumphantly completed. Then came the work of fitting the boiler, engine, and machinery—a heavy undertaking in view of inexperience and lack of appliances; but that also was successfully accomplished, and the *Fulton* only needed her guns to be a finished floating battery.

The New York Artillery Stores did not afford either the number of guns needed or the proper size; but American resourcefulness was again equal to the situation. “A prize taken from the enemy” put at the disposal of the Navy Department some cannon of the right description. These weapons were at Philadelphia, 200 miles from New York, and so that there should be no risk of the British retaking their guns, these were dragged by horses over the heavy roads of New Jersey. The carting of twenty heavy cannon in such circumstances was in itself a performance worthy of the praise which the Commissioners generously gave it.

On that early run with an actual steam warship some

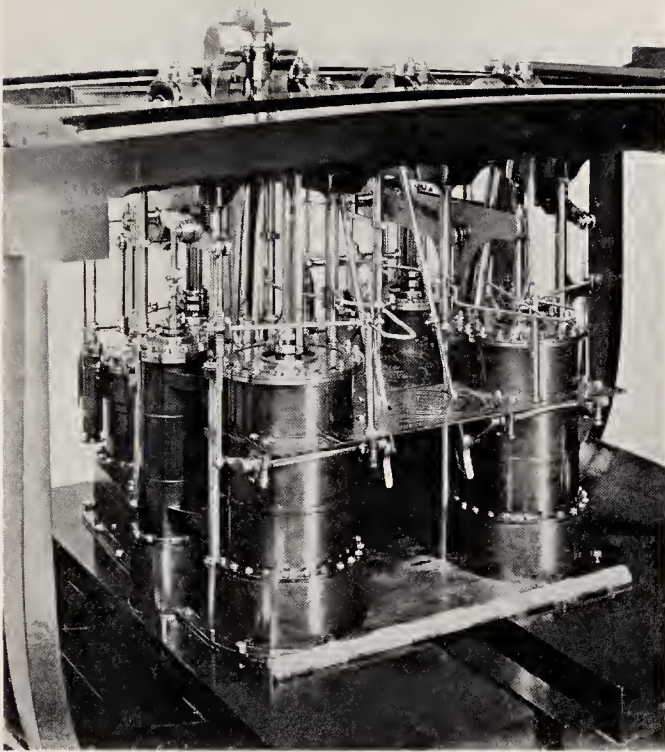
interesting material was obtained concerning her performances. With twenty-six of her "long and ponderous" guns, and a large quantity of stores and ammunition on board, the *Fulton's* draught of water was short of 11 feet. The explosion of the powder caused very little concussion, nor was the machinery in the least affected by it. During the firing the progress of the *Fulton* was steady and uninterrupted. She moved quickly, and instantly answered her double helm.

It was believed that the stokers would be forced to endure excessive heat, and, with the object of learning exactly what they suffered, Dr. Mitchel, one of the Commissioners, went into the engine-room, or "hold," as it was called, and took the temperature with a thermometer. The quicksilver, "exposed to the radiant heat of the burning fuel," rose to 116° F. ; but the doctor did not feel any ill effects from his descent. The investigation prompted the Commissioners to suggest to the Government that the *Fulton's* hold could be made cooler by providing additional apertures for the admission of air, and that on building another steam frigate, as the *Fulton* was called, the comfort of the firemen might be provided for, as in the ordinary steamboats.

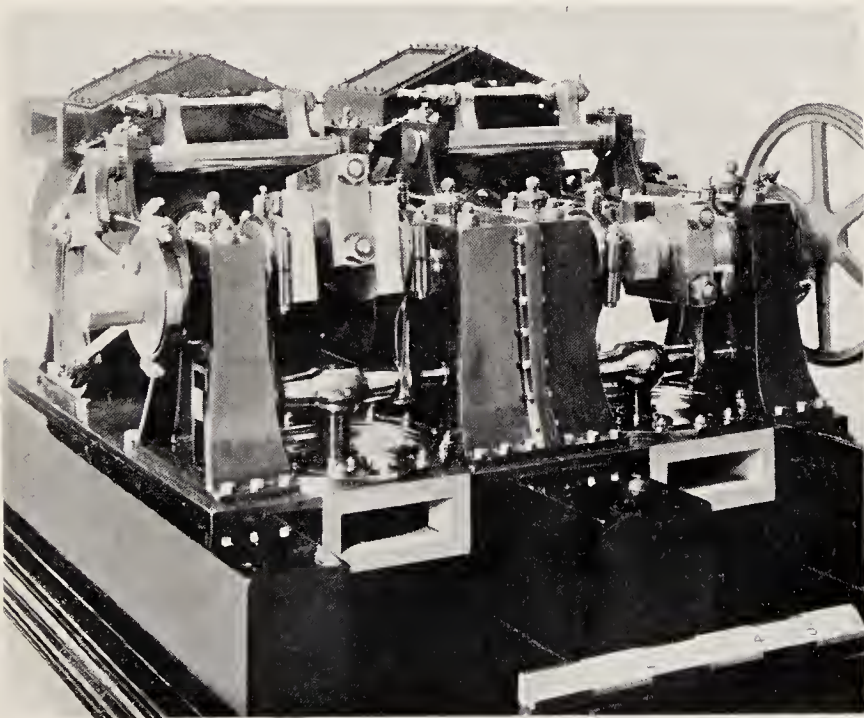
On this point of temperature it may be noted that during the Spanish-American War there were in the Tropics ships whose sleeping-quarters never had a lower temperature than 93° F., and the decks of which, in compartments over boilers and engine-rooms, were hot to feet even protected by shoes ; while in the stoke-holes the temperature reached as high as 170° F. The sick-bay temperature in at least one of the ships was

seldom below 96° or 100° , and often more than that. This state of things was principally due to insufficient employment of non-conductors in the construction, and secondarily to imperfect means for the removal by ventilation of the resulting overheated air, especially at its source or in those compartments where the heat was liberated.

The first screw vessel to be constructed by the British Admiralty was the *Rattler*, a sloop-of-war built in 1843 at Sheerness Dockyard. Her displacement was 1078 tons, and her engines, of 437 indicated horse-power, drove a screw shaft by the use of spur gearing, and gave the revolutions of the screw an increase of four times those of the crank. The screw, which is preserved at the South Kensington Museum, is two-bladed, and weighs 1·325 tons, the casting being gun-metal. The diameter is 10 feet. The screw was secured to the shaft by a through cotter, and patches were riveted on to the tips to strengthen the blades. Compared with the latest type of propeller the *Rattler's* screw is simple indeed, but it quickly showed its undoubted superiority over the paddle craft. Trials were made in 1845 between the *Rattler* and the paddle sloop *Alecto*. The test took place on 3rd April in a calm on the North Sea, both ships, which were fastened stern by stern, steaming full speed ahead. The result was a complete triumph for the *Rattler*, which pulled the *Alecto* stern foremost at a speed of nearly two and a half knots. The engines of the *Rattler* had four steam cylinders 40·125 inches diameter by 4 feet stroke. They made 25·76 revolutions per minute, which gave the screw 113 revolutions per minute. The boiler pressure of the *Rattler* was



South Kensington Museum.
THE ENGINES OF H.M.S. *DEVASTATION*, 1840-44.



South Kensington Museum.
THE ENGINES OF H.M.S. *AJAX*.

10 lb., that of her defeated rival was only 5 lb. To-day the steam pressure in a battleship's boilers is sixty times greater than that of the *Alecto*.

The clumsy, cumbrous paddle-wheel craft in the Navy had a brief and somewhat inglorious career. The side-wheels were quickly and finally vanquished by the screw, in which enormous improvements were steadily and continuously made. The first horizontal direct-acting screw engines employed in the Navy were fitted in the *Ajax*, originally a 74-gun sailing ship-of-the-line of 1761 tons. In 1848 she was converted into a steam block-ship of 60 guns, and this was done without the ship being materially altered in dimensions. The French, however, had for some years been experimenting with the screw. Engines of 650 horse-power had been fitted to the *Austerlitz*, of 100 guns, which was laid down in 1832, and had a displacement of nearly 4400 tons. Experiments were also made with the *Napoléon*, another line-of-battle ship which was laid down in 1847 and was considerably larger than the *Austerlitz*, her displacement being nearly 5000 tons. The achievements of the *Ajax* were much superior to those of the *Rattler*, her speed being just over seven knots, with a pressure of 6 lb., and 48 revolutions per minute. The diameter of her screw was 16 feet.

A great advance on the *Ajax* was the splendid battleship *Marlborough*, which was built of wood at Portsmouth. She was a ship of 131 guns and 6050 tons displacement, and was originally intended to be a sailer, but she was converted into an auxiliary screw ship, and launched in 1855. Her engines were of the return connecting-rod type, with two cylinders of

82 inches diameter by 48 inches stroke. Her propeller was two-bladed, and had a diameter of 19 feet, being so arranged that when not in use it could be lifted. The boiler pressure was 20 lb., and with engines of 3000 indicated horse-power the ship had the considerable speed of 11·2 knots. The *Marlborough* had a length of 245·5 feet and a beam of 61·2, with a depth of 25·8 and a mean draught of 26·3 feet. Her complement was the enormous number of 1100 men. She represented the ships-of-the-line at their best, and gave the utmost possible comfort and accommodation to her crew, yet a study of the reproduced diagram of the *Marlborough* will show how much confined were her people. She carried three hundred more men than a modern battleship, yet her length and beam were infinitely less, and her appliances for comfort and the preservation of health incomparably inferior to the arrangements of her successors.

The *Marlborough* was followed by the *Victoria*, the last and finest wooden ship-of-the-line. She was a three-decker of 121 guns, and was launched at Portsmouth in 1859. Commissioned in 1864, she served as flagship on the Mediterranean Station, and was discarded in 1867. The *Victoria's* engines were of 4400 indicated horse-power, and gave the ship a speed of 12 knots, the steam pressure being 22 lb. The *Victoria* represented finality in wooden ship construction, for her length over all was 300 feet, her extreme breadth 60·08 feet, depth of hold 26·8, and tonnage 4126. Her complement was larger than even that of the *Marlborough*, being 1130.

A great size in propellers was reached with the

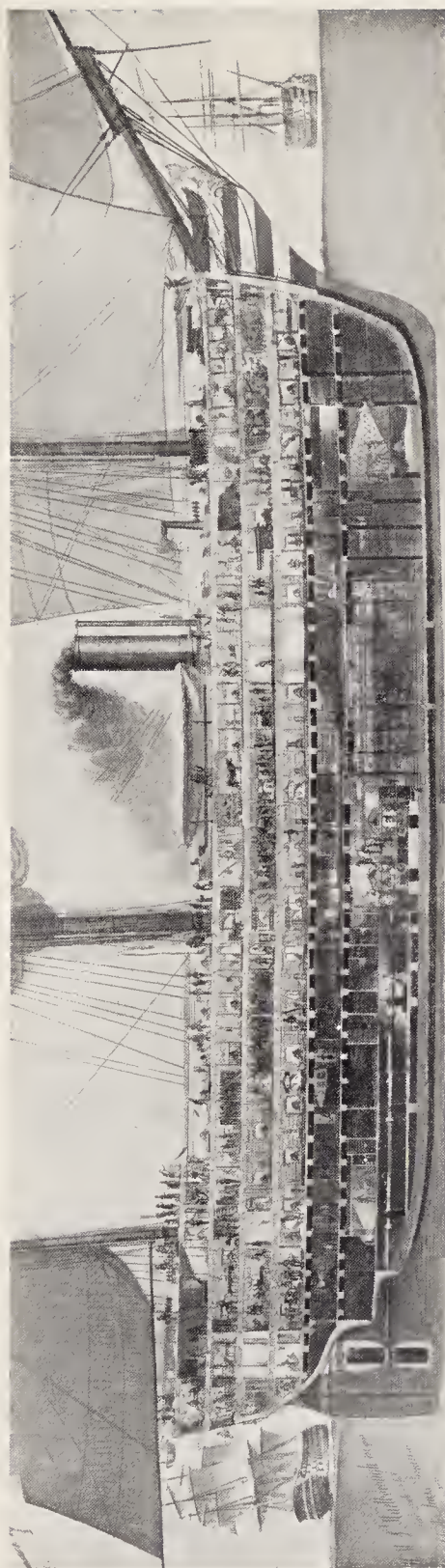


DIAGRAM OF H.M.S. MARLBOROUGH, 131 GUNS, SAIL AND STEAM SHIP-OF-THE-LINE, 1854.

Caledonia, which was begun as a wooden battleship, but changed and completed as an armoured frigate, being one of a number of ships-of-the-line to be so altered in the period from 1862 to 1864. This ship had an armoured battery 280 feet long, with armour-plates 4·5 inches thick, backed with 30 inches of oak, the weight of the armour being 930 tons. The propeller was four-bladed, with a diameter of 21 feet. By means of a clutch it could be disconnected from the engines. The trial speed was 13 knots.

By way of comparison with other propellers, it is interesting to note that the four-bladed screw of the *Umbria*, and that of her sister ship the *Etruria*, had a diameter of $24\frac{1}{2}$ feet, the largest on record for the merchant service. The screw of the American ironclad ram, *Dictator*, had a diameter of 21·5 feet, and was in a single casting which weighed 17·4 tons. The *Dictator* was built in 1863, and her engines indicated 5000 horse-power. They had two cylinders 100 inches diameter by 48 inches stroke. Her speed was 8·3 knots, with a coal consumption at full speed of 7·3 tons per hour.

A vast advance in every way was made in steam-propelled British warships with the building of the *Northumberland*. This vessel was an iron sea-going armourclad built from Admiralty designs and completed in 1865-68 at the Millwall Ironworks. She was the first ship in the Navy to be fitted with steam steering-gear. Her length was 400·2 feet, her breadth 59·3, and her mean draught 27·2 feet. She had a displacement of 10,780 tons. She and her sister ships, the *Minotaur* and the *Agincourt*, became very famous, the

engines, amongst other things, being a great improvement on anything at that time in existence. They were completely below the water-line and consequently out of the reach of shot. The engines of the *Northumberland* had two simple cylinders, 112 inches in diameter by 52 inches stroke, and steam at 25-lb. pressure was supplied by ten tubular boilers, each of which had four furnaces. The engines made 58·4 revolutions per minute, and indicated 6545 horse-power, giving the ship a speed of 14·1 knots. The four-bladed Mangin screw had the great diameter of 24 feet. The engines of the *Agincourt*, which was built by Messrs. Laird Bros. at Birkenhead, gave on trial in 1865 a speed of 15·48 knots, the indicated horse-power at full boiler pressure being 6667. The *Northumberland* was one of many battleships on which large sums of money have been wasted in futile attempts to bring them up to date, for there can be no tinkering with modern warships. In 1895 her armament was increased and she was reboilered. She is still in existence as a dépôt hulk.

These types of engines proved very successful; but improvements were rapidly made in machinery, especially with the introduction of vertical cylinders. It was not, however, until the protective power of inclined armour had been proved that it was possible to fit upright engines into warships. A revolution in the system of propelling battleships came with the introduction of twin screws, an arrangement which remained in existence with remarkable and complete success until triple and quadruple screws were employed. With the advent of twin propellers the diameter of the

screw became considerably smaller, and the tendency was to lessen, until the present form of small propeller with very broad blades was adopted. A good illustration is afforded by the case of the *Devastation*, which was fitted with twin screws, each driven by an independent pair of engines. These were of the direct-acting trunk type, and were contracted for before compound engines were adopted. The cylinders were 88 inches in diameter, and trunks $36\frac{1}{2}$ inches in diameter. The pistons had a stroke of 3 feet 3 inches. The engines indicated 6637 horse-power and gave a speed of 13·8 knots. The propellers were 17 feet 6 inches in diameter, and each was four-bladed. In the *Devastation* the working pressure of steam had risen to 30 lb. per square inch. The *Devastation* was the first sea-going ship-of-war to be designed without sails. She was a vessel of 9350 tons, and her advent roused intense interest throughout the world. She was of the same type as the ill-fated *Captain*.

While the *Devastation* was being built the *Captain* had won a high reputation at sea, and she was spoken of and written about with lavish enthusiasm. The entire nation, therefore, was stunned by the news that during the night between 6th and 7th September 1870 the *Captain* had capsized and sunk off Cape Finisterre, carrying with her some 500 men and all her officers, only the watch on deck being saved. The disaster was the more appalling because the weather was far from being bad. A special and able committee was at once appointed to inquire into the stability of the *Devastation* and other ships of her class — the *Thunderer* and the *Dreadnought*. It was found by

severe tests that the *Devastation* was a thoroughly fine and safe ship, and experience proved her to be perfectly seaworthy and wholesome and comfortable for men and officers alike.

The earlier performances of the *Devastation* were watched with the greatest interest and not without apprehension, for she was completely dependent upon her engines, sails having been entirely abolished with the masts. Again experience showed that there was no ground for anxiety in this respect, in view of the adoption of twin screws and separate engines, so that if by accident one propeller was lost or became completely disabled the ship would have still ample power to drive her efficiently.

The *Thunderer* was a great improvement upon the *Devastation*, and still further advances were made with the *Dreadnought*. The *Dreadnought* had a displacement of 10,950 tons, and in her machinery she was much superior to that of her sister ships. Her engines were of the vertical inverted compound type, and there was an independent set to each of the twin screws. Each set consisted of three cylinders, one high-pressure and two low-pressure. The diameter of the high-pressure was 66 inches and that of the low-pressure 90 inches, the stroke of the pistons being 4 feet 6 inches. The pressure had risen considerably compared with recent years, having reached 60 lb. There had been also an increase in the diameter of the propellers, that of each being 20 feet. The engines developed 8900 horse-power and gave a speed of 15 knots.

With the growth of speed there had been a diminution in the space needed for boilers and machinery,

and, what was of as much importance, a decrease in the coal consumption. The *Thunderer* had burnt 3·14 lb. per indicated horse-power, but the *Dreadnought* consumed only 2·27 lb. The present-day consumption is about 1 lb. per indicated horse-power.

For a long time the compound engine had been employed with the greatest success in passenger and cargo vessels, particularly in the former in the North Atlantic trade, and in 1873 these engines began to appear in ships of the Royal Navy. The steam pressure had quickly risen from the insignificant 5 lb. in the *Alecto* to twelve times that amount, and now the increase became as rapid in proportion during the years which followed and led up to the battleships which marked the pre-Dreadnought era and introduced the modern mammoth.

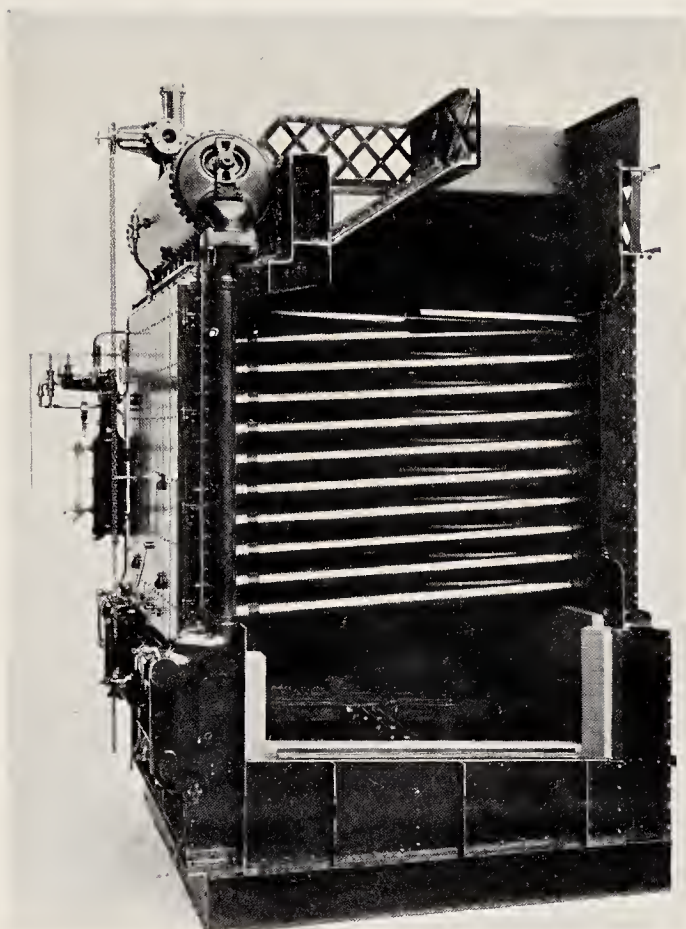
In the ships of the *Ramillies* class the machinery was contained in six water-tight compartments. The engines were two independent sets separated by a central compartment, which extended beyond the boilers and was used as a magazine. The boilers were arranged in two sets of four each, and were fired athwart ships. There was a protective deck over the engines and boilers, and further security was afforded by side armour and coal bunkers below deck.

The *Dreadnought* of the 'seventies, described by Lord Brassey as a "complete museum of all the latest and most approved inventions connected with naval construction," was the first actual battleship to be fitted with the vertical engines, which became almost universal in the Navy, until there was a revolutionary return to something of the old principle in the adoption

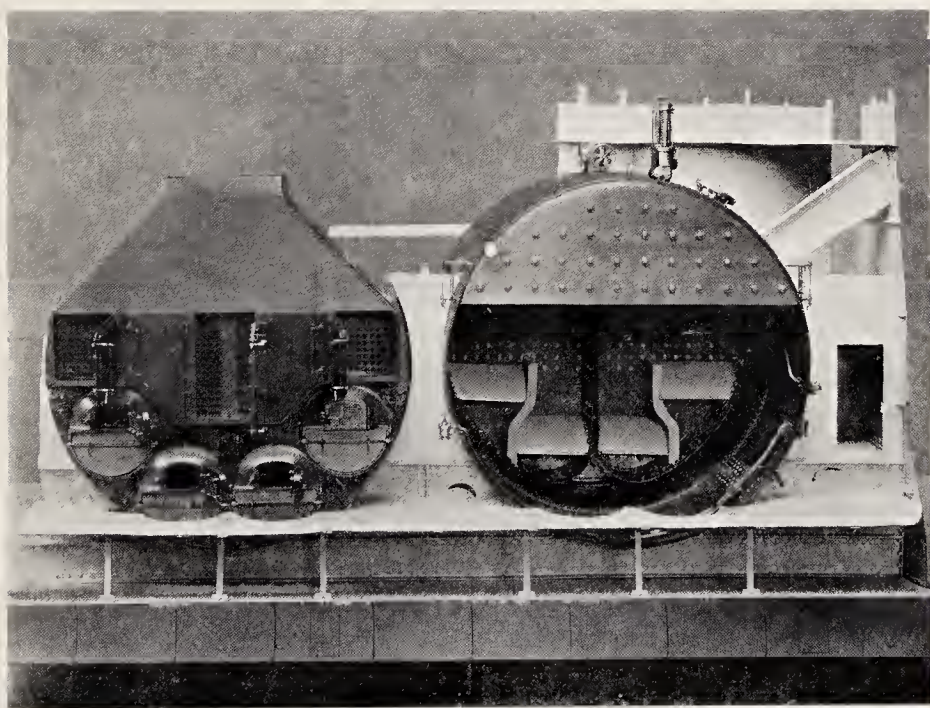
of the turbine. The first British battleship to be fitted with triple-expansion engines was the *Sans Pareil*, sister ship of the *Victoria*.

By 1881 the steam pressure employed in some of the ships of the Navy had risen to 110 lb., and ten years later a common pressure was 155 lb., and even that was soon exceeded, owing to the great improvements in boilers. In the early days of the Navy, as in the case of the mercantile marine, there was a strong prejudice against the employment of high-pressure steam, although so far back as 1854 there were in use in gunboats small cylindrical multitubular boilers working at a pressure of 90 lb. There was not, in the Navy, the class of men who were competent to take charge of intricate and delicate machinery, even if it had existed. Engineers had practically no standing, but with the rapid development of steam propulsion there came into being the highly skilled professional man who now forms such an important part of the complement of a battleship.

Owing to the increase in pressure to 60 lb. it became necessary to employ the cylindrical shell and flues, and there came into existence the "Scotch" type of boiler. This was largely employed until the introduction of the water-tube boiler. The battleship *Trafalgar*, built at Portsmouth in 1887, was fitted with a set of six single-ended high or return tube Scotch boilers, each of which was 16·1 feet diameter by 10·25 feet long, and with its water, etc., weighed 84 tons. Each boiler had a heating surface of 3050 square feet and a grate area of 110 square feet. The working pressure was 135 lb.



South Kensington Museum.
SECTION OF BELLEVILLE WATER-TUBE BOILER.



South Kensington Museum.

Excellent and reliable work was done in fine battleships by the Scotch boiler; but it was superseded by a much more delicate, complicated, and powerful steam generator—the water-tube boiler. Some of the largest warships were fitted with the Belleville boiler, originally made in France, but later introduced into Great Britain. One of these boilers had a grate area of 48 square feet and a heating surface of 1500 square feet. The steam pressure was 250 lb. per square inch. The Belleville first came into use in 1879. Since then various types of water-tube boilers have appeared, and have been divided into two classes—large tube and small tube; corresponding with the class of ship in which they are employed.

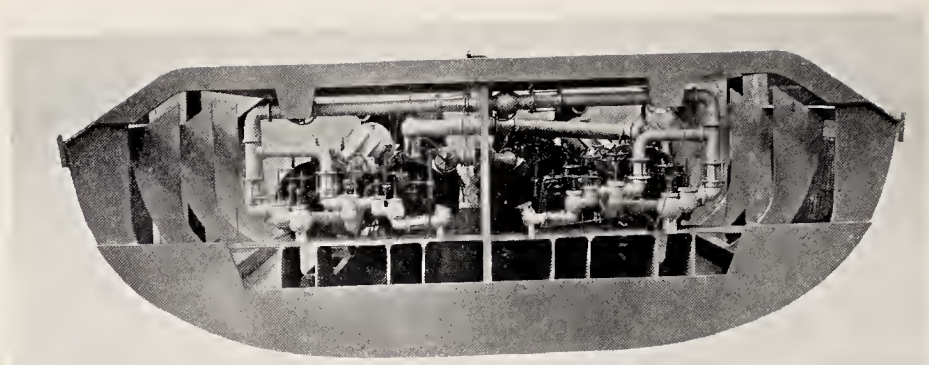
The Belleville boilers came into great prominence owing to their adoption in the Navy, and particularly in the *Powerful* and *Terrible*, each of which vessels had 25,000 horse-power. The boilers proved too complicated and delicate, and as the result of investigation by an expert committee their use was not further extended. Subsequently Babcock and Wilcox, the Yarrow large tube, the Dürr or the Niclausse type of boilers, were fitted to battleships, either in combination with Scotch boilers or as a complete installation.

Though the *Powerful* and *Terrible* are not battleships, yet they may be referred to particularly, because they were the first large vessels in the Navy to be fitted with water-tube boilers. They are protected cruisers of 14,200 tons, and in many respects were considered superior to some of the battleships of the period of their construction. The *Powerful* was built

at Barrow in 1895-97, and was longer by 100 feet than any previous British warship, her length being 538 feet. She is driven by two sets of inverted three-stage expansion engines, each with four cylinders, a high-pressure of 45 inches, an intermediate of 70 inches, and two low-pressure cylinders 76 inches diameter, with a common stroke of 48 inches. The engines developed 29,000 indicated horse-power, and gave a speed of rather more than 21 knots. Forty-eight Belleville boilers were arranged in eight groups in separate compartments, and supplied steam at a pressure of 260 lb. The *Powerful* is likely to be broken up shortly.

The *Diadem*, a smaller *Powerful*, may be also mentioned, because she was the first ship in the Navy to have Belleville boilers permanently fitted with an "economiser," which is an arrangement for securing more perfect combustion and economy of fuel. To such a state has this economising come, that the consumption has been lowered, as we have seen, to about 1 lb. of coal per indicated horse-power per hour. Oil fuel is efficiently employed, in part in large ships, but entirely in some small craft.

By far the most important change which has been made in the modern steam navy, in relation to propulsion, is the introduction of the turbine. It was in 1894 that the Hon. C. A. Parsons produced his experimental vessel the *Turbinia*, and amazed the world with her speed of 34·5 knots—nearly 40 miles—an hour. The undoubted success of this method of propulsion was followed by the construction of two destroyers, the *Viper* and the *Cobra*, each of which was fitted with steam turbines giving a very high rate of speed. The



The Parsons Marine Steam Turbine Co., Ltd.

MODEL OF A 4-SHAFT ARRANGEMENT OF PARSONS' MARINE TURBINES
FOR BATTLESHIPS.



Sir W. G. Armstrong, Whitworth & Co., Ltd.

A TURBINE-DRIVEN BATTLESHIP'S SPEED TRIAL.

Cobra, on her way down the North Sea in somewhat bad weather, was lost with most of the people on board, and the *Viper* was wrecked by going ashore.

The result of comparative trials made with ships fitted with reciprocating engines and other vessels of the same class equipped with turbines led to the general adoption of the turbine system in the Navy, and now all new warships are fitted with turbines. The first battleship to be equipped with them was the *Dreadnought*, which in this respect, as well as embodying the "all-big-gun" principle, revolutionised the type of modern battleship. To develop the *Dreadnought's* 23,000 horsepower and produce her speed of 22 knots, twenty-two boilers would have been needed with reciprocating engines, whereas with the turbines eighteen are sufficient.

The advantages of the turbines over reciprocating engines are reliability in service, reduced weight, freedom from vibrations, and economy of fuel at high rates of speed.

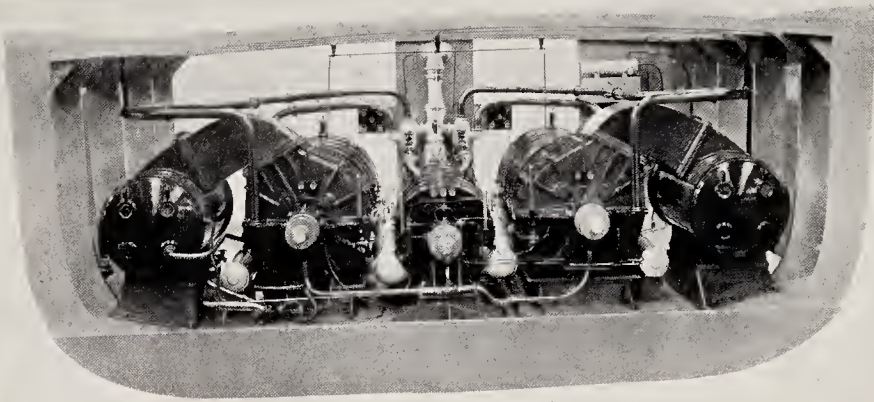
Experience has shown that the water-tube boiler for marine work has many advantages over the tubular, or Scotch type of boiler, the principal being quickness in raising steam, lightness, the power to withstand high-pressures, and comparative immunity from accident.

Fifteen water-tube boilers of the Babcock and Wilcox type are fitted in the first-class battleship, *Lord Nelson*, of 16,500 tons, built and engined by Messrs. Palmer at Jarrow-on-Tyne in 1904-08 from the designs of Sir Philip Watts. These boilers have a heating surface of 50,265 square feet and a grate area of 848 square feet, the maximum steam pressure being 275 lb.

In 1908, during full-power trials, a speed of 18·9 knots was realised, with an indicated horse-power of 17,445. The *Lord Nelson* represents the final development of the direct-acting engine. Her propelling machinery consists of two complete sets of three-stage triple-expansion engines, which are fitted in separate compartments, which have no communicating doorways. Each set of engines has four steam-jacketed cylinders, a high pressure of 32·75 inches, an intermediate pressure of 52·75 inches, and two low-pressure of 60 inches diameter, with a common stroke of 48 inches. The propellers are of manganese bronze, and have a diameter of 15 feet. The vast differences between the propelling machinery and screws of this battleship and those of her predecessors will be noticed.

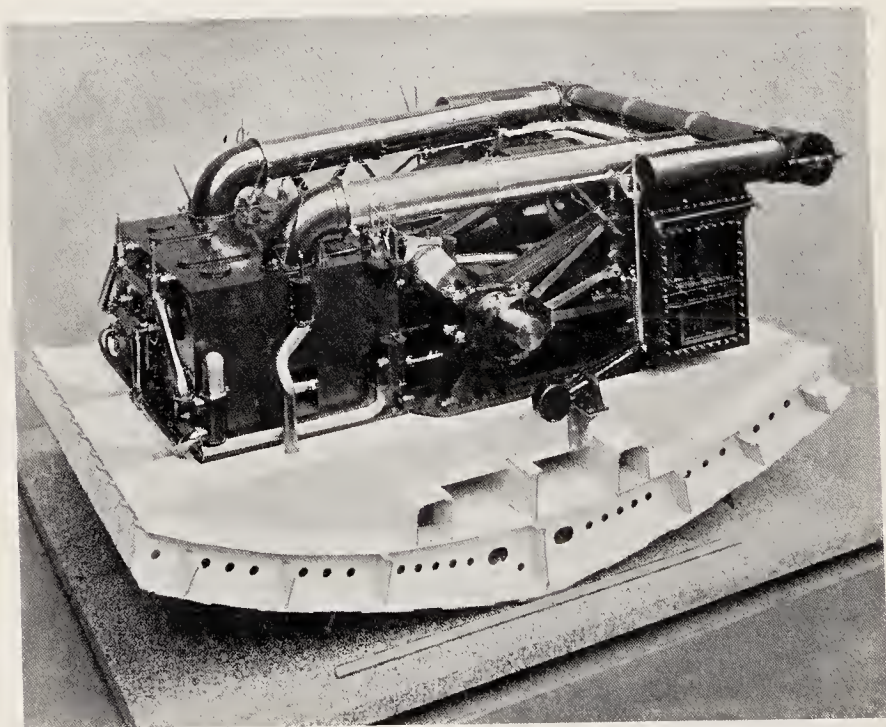
Repeated experiments have demonstrated the superiority of the turbine over the old types of engine, and in particular have given much greater control over battleships than had previously existed.

In the most modern type of battleship three or four propellers are used, these being of much smaller diameter than the earlier types employed, for the reason that the blades are much broader and work at a far greater number of revolutions per minute than those driven by reciprocating engines. So rapidly, indeed, can propellers be revolved by turbine engines, that there was discovered what is now known as cavitation, which means that a cavity of air is formed immediately in the wake of the propeller. This naturally reduced the working efficiency of the screws and lessened the speed, owing to the loss of power in the water; but research, energy, and ingenuity over-



The Parsons Marine Steam Turbine Co., Ltd.

MODEL OF A 3-SHAFT ARRANGEMENT OF PARSONS' MARINE TURBINES.



South Kensington Museum.

ENGINES OF H.M.S. NORTHUMBERLAND, 1865-8.

came the difficulty, which is now eliminated. The easiest way of overcoming the obstacle appeared to be, of course, a reduction in the number of revolutions per minute.

The principle of the turbine is very different from that of the ordinary, familiar, and splendid vertical engine. It cannot be said that the appearance of the engine-room of a turbine-driven ship is comparable in majesty and impressiveness with that of an engine-room of one of the older battleships. There is the absence of the ponderous cranks and the enormous pistons, and a reversal of the upright principle in placing the cylinder to the horizontal.

A comparison of the illustrations which are given of the Parsons' Marine Turbines and the horizontal engines of the *Northumberland* will show how striking is the return to the old style so far as compactness and lowness go. In the case of a free shaft arrangement there is one high-pressure turbine driving the centre shaft, and two low-pressure turbines, working in parallel, driving the wing shaft. A reversing turbine is placed in the exhaust casing of each of the low-pressure turbines. When going ahead, steam from the boilers is admitted through the main regulating valve to the high-pressure turbine, and after expansion it passes to each of the low-pressure turbines and from them to the condensers in the wings of the ship. The wing shafts only are used when manœuvring, steam being admitted directly into the low-pressure turbines or into the reversing turbine as necessary. This arrangement enables the port or starboard engine to be worked ahead or astern independently of each other and of the

high-pressure turbine, which rotates idly in a vacuum whilst the vessel is manœuvring. In battleships turbines have about the same weight as, or less than, reciprocating engines.

With turbine engines and water-tube boilers it has become possible to give to a ship-of-war a speed that was unthought of a few years ago. The designed horse-power of the *Dreadnought* is 23,000 and the speed 22·4 knots; the battleship cruisers have a designed horse-power of 41,000, with a speed of about 28 knots; but the later type of the *Lion* class have 70,000 horse-power, with a speed also of 28 knots. This enormous power is equalled only by that of the *Mauretania* and the *Lusitania*, which are turbine-driven ships with four propellers.

Some remarkable records have been established recently by battleships which have accomplished things that could not have been undertaken in the earlier days of steam, and have carried out long cruises successfully and pleasantly.

The American battleship *Delaware* completed a 26,000-mile voyage, during which her average speed was only a little less than 13 knots. Her engines, which are of the Curtis turbine type, develop 31,820 horse-power, giving her a speed of $21\frac{1}{2}$ knots. Before returning to Boston she had visited various parts of the world, and was in such perfect trim at the end of her cruise that she was able to send to the Navy Department the message, "All well, and ready for anything." The *Delaware*, like many other modern battleships, is able to use oil fuel, and the performances of the ship with the use of this liquid fuel were most successful.



THE OLD FRENCH BATTLESHIP *VALMY*, SHOWING THE
ENORMOUS FIGHTING-TOPS.



THE U.S. BATTLESHIP *DELAWARE*, SHOWING THE LATTICED MASTS.

Another remarkable record was that of the German cruiser *Von der Tann*, which covered 14,000 knots without any strain on, or mishap to, her turbine machinery. The distance of 3500 knots was run at an average speed of 16 knots, with occasional spurts. When the ship was docked even a close examination failed to reveal any serious defect.

These interesting and pleasant cruises, undertaken with the object of paying friendly visits to foreign ports, served also to show the almost perfect reliability of turbine engines. The turbine, indeed, has been a triumphant success. No warship of importance which is now built is propelled by any other form of machinery. As with the water-tube boilers, so with the turbine; there are several systems, but the principle is the same, and the chief type in use remains the Parsons. With the immense growth in horse-power for individual ships the total power represented by turbines has become enormous, and that of the Parsons steam turbines, which had been, or were being, applied to marine propulsion had at the end of 1910 an aggregate of more than 5,000,000.

The very existence of the Navy depends on the efficiency of the steam department of each vessel composing the fleet. Despite all that science and invention have done in developing the generation of steam and providing new methods of using fuel, coal remains the chief factor, and coal of the very best sort is needed for naval purposes. In this respect Great Britain, with her steam navy, is as fortunately placed as she was when vast quantities of timber were required for ship construction. The forests supplied the oak; now the mines

furnish the raw metal for the hulls and guns and machinery, and provide the coal, without which the fleet would be practically useless.

This question of coal supply is one of the most serious in connection with the efficiency of the fleet, and the provision of the fuel entails a considerable annual expenditure. Vast quantities of coal are held in reserve in various parts of the world, and heavy contracts are periodically placed by the Admiralty for supplies. Towards the end of 1911 the Admiralty contracted for about one and a quarter million tons of Welsh coal for 1912 at 16s. 6d., or about 1s. per ton advance on the prices for 1910. This transaction alone shows the gigantic nature of the demands which the Navy makes upon the coal-fields of the country.

For principal purposes Wales has the monopoly of the supply of steam coal for the fleet; but in some of the Colonies, particularly New Zealand, coal of excellent quality is mined, and it is a proud boast of New Zealand that the coal which saved H.M.S. *Calliope* when she steamed so gallantly from the fatal harbour of Apia, in the South Seas, was from Westport, a New Zealand colliery. When the King, as Duke of York, passed under a great arch at Wellington, which was built of New Zealand coal, he saw the inscription, "The coal that saved the *Calliope*." Until the time of the Samoa hurricane this product of the Westport mines had not been considered the very best steam coal in the world; but that claim was made when the *Calliope* had distinguished herself by such a thrilling and courageous achievement.

Just as in the old days of sail, ships vied with each



THE LAST OF SAIL. AN OLD TRAINING-BRIG.



A CUSTOM OF THE PAST. MANNING THE YARDS.
H.M.S. CALLIOPE.

other in their efforts to get first place for smartness, so nowadays, in a less romantic fashion, there is the keenest competition to win the lead in coaling. The work is as hard as it is dirty, and some remarkable records have been established. These are frequently published, and they appear to possess the astonishing quality of being the records of all records. What is given as a record for ships of the *Dreadnought* class was made by H.M.S. *Colossus* on Saturday, 23rd September 1911. She coaled and completed with 650 tons in less than two working hours, making an average of 326 tons an hour. Rain was falling when coaling began, and it continued during the greater part of the operations, making the work much harder than it would have been in fine weather, and throwing greater glory on the men who did it.

In the German Navy strenuous efforts are also made to establish records in coaling, and when any remarkable achievement is reported the Kaiser promptly takes notice of it, giving to such matters an importance which is perhaps somewhat exaggerated, and to the British mind unnecessary. On 3rd July 1911, for example, the Emperor signed a Cabinet Order which was published, and contained the following gratifying paragraph :—

“On 1st June, my battleship *Posen* took on board 900 tons of coal in 1 hour and 45 minutes, and achieved a *maximum* of 642 tons and an average of 514·29 tons in the hour. This is the finest achievement which a ship of my Navy has yet placed to its credit. I express my warm recognition to the officers and crew, and I decree that this order shall be read aloud on parade and then be framed and glazed and hung up in the ship.”

In February 1912 the Emperor issued another Order, stating that on the 9th of that month his battleship *Heligoland* took on board 1100 tons of coal in two hours, with a *maximum* speed of 671 tons and an average speed of 550 tons, thus beating the record of the *Posen*.

It will be observed that the achievement of the *Colossus* is insignificant compared with that of the *Heligoland* and the *Posen*; but the published figures may be wrong, and nothing is said in either case as to the number of men employed in coaling.



“From a mass of metal red
Human hands in many days
Bring to being, grim and dread,
Lord of All the Waterways.”

CHAPTER XV

THE TYNE AND WARSHIPS

IF you look from the High Level Bridge at Newcastle you will see a waterway which is associated with the earliest of British warships and the latest type of battleship. Compared with the Thames the Tyne is insignificant; yet within its narrow, winding limits there is always to be seen a fleet of war and merchant ships in various stages of beginning and completion; and in the vast and wondrous workshops on its banks there is constantly progressing the building of engines and the manufacturing of guns; for here are situated the famous works of Sir W. G. Armstrong, Whitworth & Co., Ltd., works from which there comes in due season the complete gigantic modern battleship.

The names of Armstrong and Whitworth are inseparably connected with that revolutionised Navy which came into being with the advent of the *Warrior*. In the prolonged and costly fight between the gun and armour the gun has conquered, and to-day there is no doubting the mastery of the 13·5-inch weapon. That deadly and destructive piece of ordnance is the result of the researches and experiments of the two men whose names are borne by the great firm of Northumbria's

chief river. So far-reaching were Mr. Whitworth's discoveries and improvements in connection with small-arms, that he was spoken of as the greatest mechanical genius in Europe; yet when he began his operations he was not a practical gunmaker; nor was Mr. Armstrong—afterwards a baronet and then a peer—a man of war by upbringing. He was originally a solicitor; but his unconquerable leaning towards mechanical invention compelled him to abandon law for science, the result being the establishment of the Elswick Engine Works, which grew to the present gigantic proportions of the Elswick Works.

No Power in the world, least of all Great Britain, is capable of building all her own warships in Government yards. Contracts must be, and are, regularly placed with private yards for the construction of ships. The United States, Germany, Russia, France, Japan, and the rest of the maritime nations adopt this method, and must continue to do so; and inevitably a large proportion of the work has been given to the Tyne. Sir W. G. Armstrong, Whitworth & Co., Ltd., have built for British and foreign navies no fewer than 128 warships and other armed vessels, with a total displacement of 493,789 tons, and with machinery representing 1,009,897 horse-power, or, in round figures, a tonnage of half a million and a horse-power of a million.

The flags of sixteen nations are represented by these imposing totals: Great Britain, the United States, Japan, Brazil, Chili, China, Norway, Argentine, Austria, Italy, Holland, Portugal, Roumania, Russia, Spain, and Turkey.



A BATTLESHIP LEAVING THE TYNE.

The principal figures were—

Flag.	No. of Ships.	Displacement.	Horse-power.
		Tons.	
British . .	40	168,363	360,581
Japanese . .	13	100,587	169,244
Brazilian . .	11	81,610	133,893
Chilian . .	9	61,070	121,479
Chinese . .	22	25,765	67,193

The vast work of the company requires extensive premises, and these are furnished by the existing yards and shops, and will be afforded by the new premises which are being constructed at Walker-on-Tyne.

When warships were built in the old days on the Tyne and Humber, the progress was slow and dignified, in keeping with the locomotion of the age. Most of the work, however laborious, was done by hand, and accomplished leisurely. The timber was fetched, often from far distances, and slowly trimmed or steamed to the required shape; while frequently there was a long and inevitable delay because of the difficulty of getting naturally shaped pieces of oak and other wood for knees and frames. To-day there are no such drawbacks to be overcome. A contract is given, and a certain time is allowed for work. Within that period the task must be fulfilled, and the only thing that prevents successful achievement is labour trouble, arising mostly from the influence of glib vapourers who have nothing at stake. Apart from these drawbacks there is small chance of even a colossal battleship like the *Minas Geraes* not being finished and delivered according

to contract time. This fine battleship, of the latest *Dreadnought* type, was launched in 1908 and completed in 1910. She has a displacement of 19,250 tons, and an indicated horse-power in her turbine engines of 24,500, giving her a speed of 21·43 knots. Her main armour is 9 inches, both for the belt and the big guns; and she has a coal capacity of 2000 tons. Her armament consists of twelve 12-inch guns, twenty-two 4·7-inch quick-firing, and eight 3-pounder quick-firing, with four torpedo-tubes.

The photographs which are given of this noble ship show her as she appeared at her launch and during completion; they also represent her at sea and in graving-dock. One of the turrets, for a pair of 12-inch guns, is represented being lowered into position. The turret, as it appears in the photograph, weighs 102 tons, and the crane is 150 tons.

The most remarkable of the photographs is that which shows the *Minas Geraes* firing a simultaneous broadside of ten 12-inch guns. This photograph is probably unique, but the dense clouds of smoke which appear do not exist in fact. The camera records in an exaggerated manner the reddish-brown fumes from exploded cordite which, while transparent to the eye, quickly dissipates.

Another famous ship from the Elswick Works was the *Victoria*, whose loss in the Mediterranean after colliding with the *Camperdown* amazed and horrified the world. At that time the *Victoria* was admittedly the finest and most powerful battleship in the world; yet she had only about half the tonnage and horse-power of the *Minas Geraes*, and her cost of construction was



Sir W. G. Armstrong, Whitworth & Co., Ltd.
THE MINAS GERAES FIRING A BROADSIDE OF TEN 12-INCH GUNS.

only about half. This enormous growth in size, power, and cost, as well as the change from inverted engines to turbines, had taken place in considerably less than twenty years.

The Elswick Shipyard has a river frontage of about 2300 feet. It possesses berth accommodation for the building of various classes of vessels at the same time, three of the berths being piled and strengthened, so as to be capable of receiving the largest and heaviest war-vessels. Two of these berths have been specially strengthened with ferro-concrete piling, and a vessel of 35,000 tons displacement could be built upon them. The shipyard, drawing, designing, and commercial offices, which are contained in a fine building at the entrance to the yard, are very commodious and well fitted out. Adjoining the offices are the large general stores and warehouse. The yard is intersected by lines of rails, and these run alongside each building berth; whilst powerful travelling cranes for dealing with large and heavy castings, etc., and locomotive cranes for light lifts, are constantly in use in and about the shipyard.

The main machinery shop is about 1000 feet long and contains every description of the latest improved types of punching, shearing, angle-cutting, drilling, bending, and planing machinery; it is also equipped with hydraulic presses and hydraulic cranes, and the most modern appliances for dealing quickly with heavy ship plates and other work. Above this building are situated the shipyard fitting shop, sheet-iron workers' and plumbers' shop, and also the riggers' loft, etc.

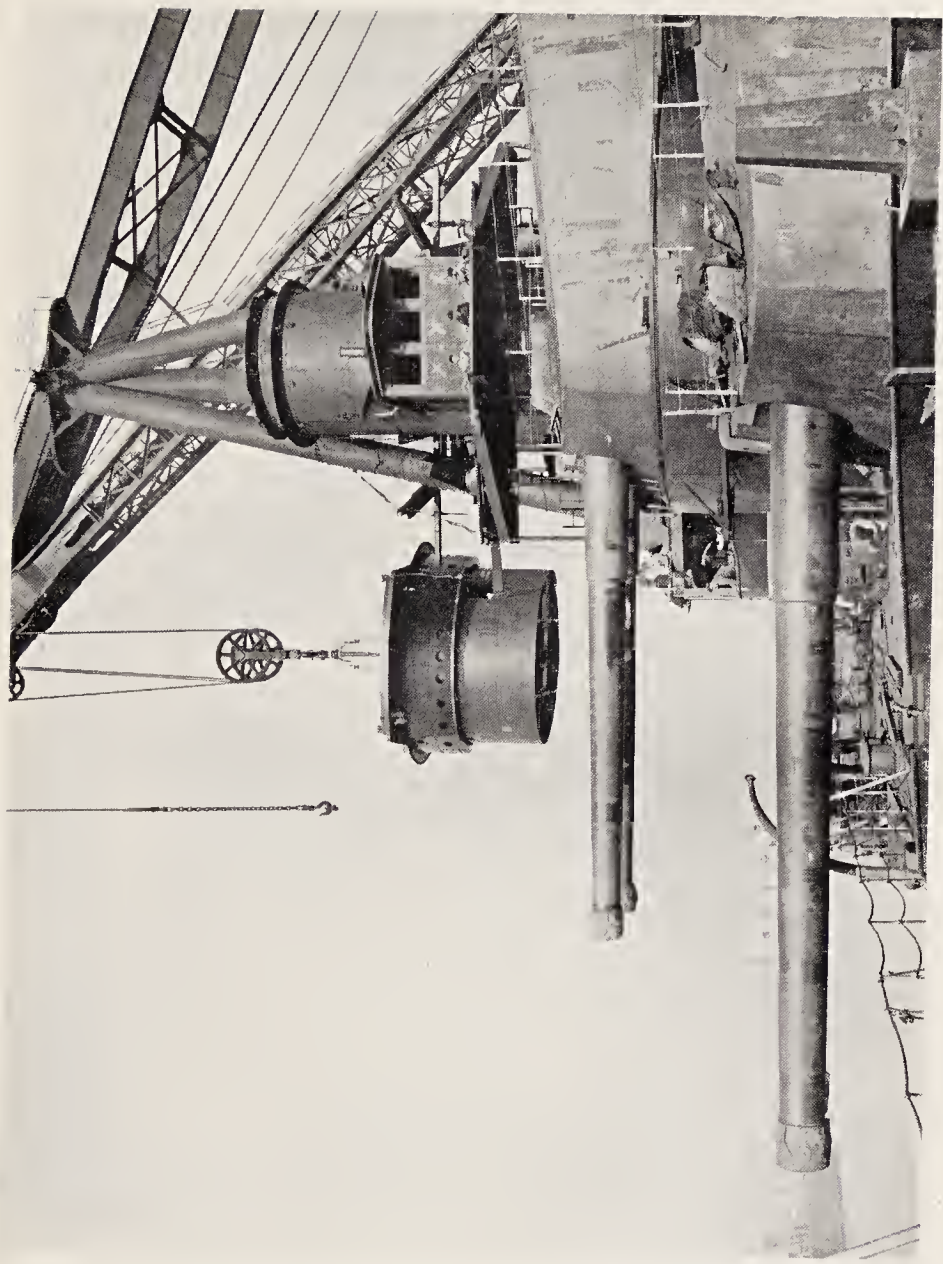
The blacksmiths' shop, smithy-fitting shop, and angle-turning smiths, with the furnaces for heating angle bars,

small and large plates, are at the west end of the yard, and angle smiths are situated in the centre of the yard. All the large power hammers in these shops are of the pneumatic type, and the fires are supplied with air by motor-driven air-blowers. What would our torch and tar-barrel burning predecessors have thought of this?

At the east end of the yard is a large and commodious building, which contains the sawmill on the ground floor, the joiners' and pattern shop on the first floor; and the mould loft—with a clear floor space of 250 feet by 65 feet—is on the second floor. The boat-building shed, sail-makers' loft, and model-makers' shop are also situated at the east end of the yard.

Four air compressors are installed and connected up by a main lead of piping to large reservoirs at each end of the yard, and branch leads are lead from the main to each building berth, fitting-out quay and to each shop as may be required for supplying air to the very large number of portable and fixed pneumatic tools used in this yard. The whole of the machinery in the yard, with the exception of the steam-travelling cranes, is electrically driven, and the installation of motors represents over 2500 b.h.p.

At Elswick there is an extensive stretch of berthing and fitting-out wharfage with powerful cranes, sheerlegs, and other fixed and movable appliances for dealing with heavy weights of every description. These appliances include a hydraulic crane capable of lifting up to 150 tons, and sheerlegs of a lifting capacity up to 100 tons, in addition to smaller travelling cranes, warping capstans, mooring bollards, and other requisites adapted to quick and convenient handling, loading, and unloading



Sir W. G. Armstrong, Whitworth & Co., Ltd.

LIFTING A TURRET ON BOARD THE MINAS GERAES.

of every kind of vessel, the transport of heavy material such as important parts of machinery, boilers, armaments, guns, mountings, turntables, etc.

In addition, the firm has a thoroughly equipped floating workshop provided with various machine tools, smiths' forge, etc., for use alongside vessels when away from the yard.

The capacity of the firm for the building and equipping of warships is shown by the fact that, during 1896, there were in various stages of completion no fewer than twenty warships of different classes, fifteen being under construction at the Elswick Shipyard, and five at the Walker Shipyard of the company. This extensive list included a 12,300-ton first-class battleship of 14,000 h.p.; two first-class armoured cruisers, 9700 tons, and 18,000 h.p. each; one armoured cruiser of 8500 tons and 16,000 h.p.; one armoured cruiser of 7000 tons and 18,000 h.p.; two coast-defence armour-clads, each having a displacement of 3400 tons and 4500 h.p.; eleven second- and third-class cruisers and two torpedo-boat destroyers. The aggregate displacement of these vessels amounted to no less than 98,000 tons, the indicated horse-power of the machinery fitted in them totalling up to 233,000. Six of these vessels—one first-class battleship, one first-class armoured cruiser, and four second-class cruisers—were launched from Elswick shipyard in that year.

Sir W. G. Armstrong, Whitworth & Co., Ltd., have prior claim to the large graving-dock belonging to Messrs. Robert Stephenson & Co., Ltd., Hebburn-on-Tyne, for the docking of war vessels built by the firm, so that the Elswick firm possesses every facility for building and completing war vessels of all types.

Notwithstanding the importance of the Elswick Yard, the directors of the company have realised that, with the great increase which has taken place in the size of warships during recent years, the area of the present yard is becoming inadequate to deal with the construction of a number of such warships in the future. A site has therefore been obtained for a new shipyard at High Walker, some five miles nearer the mouth of the river than the present yard at Elswick, and the excavation of this land, in order to make it suitable for building purposes, is in progress.

When completed, which will probably be in two or three years, the yard will have a river frontage of nearly a mile, will occupy an area of over seventy acres, and will have building sites for seven or eight vessels, varying from a cruiser 500 feet long and of six or seven thousand tons displacement, to a possible cruiser or battleship of 1000 feet long and of any beam. The yard will be equipped with all the latest shipyard machinery, and electric and pneumatic plant will be extensively used.

Owing to the length of the river frontage, it will be possible so to arrange the jetties as to enable all ships to be moored end on to one another, one of the important advantages of this arrangement being that, during the fitting out of a vessel, the strictest secrecy may be preserved, where desired, as workmen and others engaged on one ship will be able to reach her without having to go on board or trespass on any other. A very extensive scheme of construction and fitting-out shops and sheds, stores, etc., is contemplated, and when the yard is completed and in full working order, it will



A FLOATING-DOCK FOR DREADNOUGHTS.

be equal to, if not better than, any private shipbuilding yard in Great Britain.

Although in its present form the Walker Shipyard confines its operations to mercantile work and is entirely different and distinct from that at Elswick, the earliest Tyne-built war vessels were produced in the older shipyard; and this fact was one of the principal causes which led to the amalgamation between Sir W. G. Armstrong & Co. and the firm of C. Mitchell & Co.

As now arranged, the Walker Shipyard has an area of about 30 acres, with a river frontage of 950 feet. There are six building berths of 450 to 650 feet in length. The general formation of the ground, although it has militated against any large scheme of extension, has provided an element of economy in the fact that the general inclination is all towards the river, a circumstance of which the utmost advantage has been taken.

The yard, though not large, has been laid out with a view to produce work as rapidly as possible, and with this object railways of normal and narrow gauge are led to all parts of the ground, and transporting cranes and runners are arranged wherever they can be usefully employed, so that the movements of material in its various stages are quickly and economically effected.

It is hard to realise, when one looks upon the wonderful appliances available in modern shipyards, that within living memory wood alone was used in constructing battleships, excepting the limited employment of metal for supporting and strengthening purposes; and that hand and horse labour were employed in romantic creeks and quiet harbours adjacent to oak forests, to build battleships by the light of tar-barrels and torches. The

Navy of oak was constructed near the forests ; the Navy of steel is mostly built, so far as private enterprise is concerned, in the vicinity of mines.

The *Victory* is reminiscent of glades and woods ; the metal mammoth comes into being from the gloomy pit.



A DREADNOUGHT LEAVING THE TYNE FOR STEAM TRIALS.

CHAPTER XVI

THE WAR OF THE MAMMOTHS

NELSON never chased the French more ruthlessly, nor Blake the Dutch, than the nations to-day pursue each other in the war of the mammoths, which are the modern battleships. Forty years ago, when Germany so amazingly vanquished France, she had nothing that could be called a navy, yet to-day she has a fleet which is the second in the world. During the same period Japan has taken rank as one of the great naval Powers. Six years ago the *Dreadnought* outclassed and scrapped the world's most powerful existing battleships, to-day the *Dreadnought* has been conquered by the *Orion*. When, in 1906, the *Dreadnought* was commissioned, every naval expert and naval officer realised that the rest of the battleships of the world were obsolete. Wondrous tales were told of her appalling powers, and she was the admiration, fear, and envy of the world which was not England. Her speed, armour, general construction, and, above all other things, her guns and their disposition, made her at once the most formidable and impressive thing afloat. It was claimed, and the claim was generally allowed, that there was no other battleship which in action could keep afloat within half a dozen miles of her, and the most powerful and costly ships-of-war became as nothing by comparison.

On 1st October 1906 the *Dreadnought* left Portsmouth for her trials, and then and later her achievements, when they were definitely known, were regarded with astonishment. At the famous naval review in the Thames, in 1909, she was the flagship of a noble fleet, and all who saw that vast array of ships gazed chiefly at the *Dreadnought*. At the Coronation Review at Spithead, in 1911, the *Dreadnought* passed almost without notice, for she was merely one of a number of battleships of her own description, and her principal claim to recognition was that, like them, she was an "all-big-gun" ship. Her compeers were the *Bellerophon*, *Collingwood*, *Neptune*, *St. Vincent*, *Superb*, *Téméraire*, and the *Vanguard*, with a tonnage ranging from 17,900 to 20,250, a complement of from 800 to 870, a speed of 21 knots, and an armament of ten 12-inch guns. The *Neptune* was the latest battleship to be afloat, and she showed many great advances on the *Dreadnought*.

Progress in naval construction is ceaseless, and even the mammoths which were seen at the Coronation Review are to be exceeded in size. It is stated that the Admiralty have decided upon a type of battleship cruiser with a length of 702 ft., a breadth of 90½ ft., and a horse-power of 87,000, giving a speed of 30 knots.

Not far away from these mammoths was a still greater monster, the *Orion*, completing at Portsmouth Dockyard, and carefully guarded from observation—even at a later period of the year, from the members of the British Association who were given special opportunities of seeing the yard and ships. Yet something reliable concerning the *Orion* had been made



THE ARMOURED BROADSIDE SHIP.



A CAPITAL SHIP.

known by the First Lord of the Admiralty (Mr. McKenna) in his speech on the Navy Estimates of £44,392,500—a speech which clearly summarised the existing state of things concerning battleships, and from which, therefore, some extracts may be made. It was delivered in the House of Commons on 16th March 1911, when Mr. McKenna said:—

“That sum represents not merely the total estimated expenditure for the year 1911–12 for Naval services, but it includes no less a sum than £1,300,000 for interest upon former loans. . . .

“I know it has been suggested in various quarters that this is a moment when borrowing would be a useful expedient for us to adopt. I need hardly say that it would be very agreeable to me if I could conceal £5,000,000 or £10,000,000 behind a loan. But I should not be doing my duty to the House if I did not point out the mischief of such a policy. We have got to maintain a Navy—a supreme Navy—not merely for the year 1911–12, but for so long as the British Empire is to last. Now a loan is a temporary expedient, and I would never advise this House to adopt a temporary expedient for the purpose of supplying a permanent need. . . . These are the current estimates for the year, and though they are exceptionally high, and I hope they have now reached their highest point, still they only meet the needs of the Services of the year, and they ought to be met, therefore, by the expenditure of the year. The increase over last year is £3,788,800. The charge for new construction in the year is £15,063,000. . . .

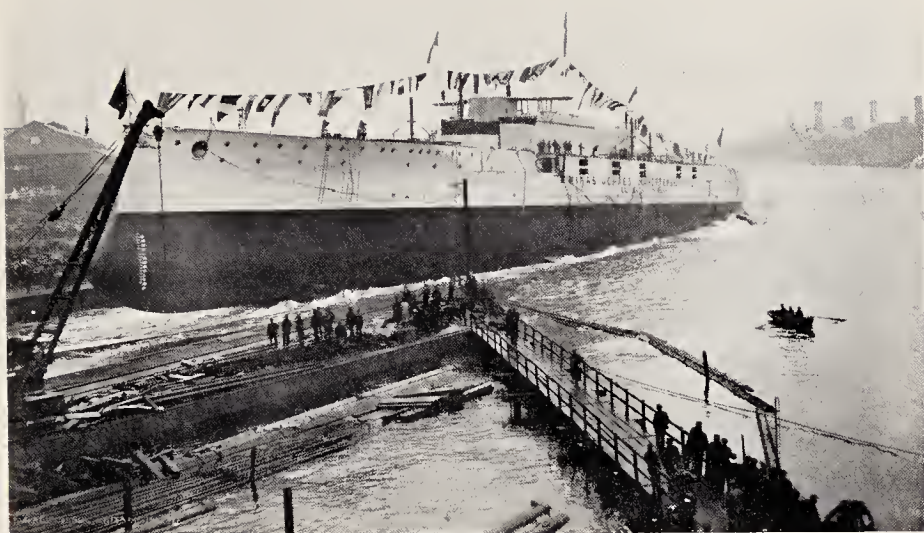
“In no earlier case has there ever been such a

large amount spent on new programme within the year. We have laid down our ships at such a time as to enable us to have them in commission at a particular date. According to our forecast of the development of other Navies, we require a Navy of a certain strength in the spring of 1914. . . .

“We propose to lay down five large armoured ships. They will not be laid down before December of this year. They may be laid down in January of next year. The contract time for the construction will be two years. As to the types of the ships, the House would not expect me at this moment to disclose particulars as to tonnage, speed, guns, and so forth, of ships that are not yet laid down; but it may be of interest to the House for me to remind hon. Members of the type which was laid down in November 1909—I refer to the battleship *Orion* and the cruiser *Lion*—and I can say generally that the new ships of the coming year will be of the type of the *Orion* and the *Lion*.

“In the *Orion* we have for the first time a ship carrying 13·5-inch guns, which has ten such guns all carried in the centre line of the ship. Her speed will not be less than that of the original *Dreadnought*, and I will content myself with saying that her armour protection will be adequate.

“With regard to the *Lion*, she will carry eight 13·5-inch guns also all arranged upon the centre line of the ship, which means that all eight guns in the case of the *Lion*, or in the case of the *Orion*, all ten guns will be available on either broadside. As to the speed of the *Lion*, there again, I can with safety go so far as to say that it will be a material improvement upon



Sir W. G. Armstrong, Whitworth & Co., Ltd

THE LAUNCH OF A DREADNOUGHT.



A SPLENDID PRE-DREADNOUGHT, H M.S. LONDON.

the speed of the 'Invincibles.' This progress in size, in guns, in speed, in power, and in cost has not been of our seeking. The cost has not increased in anything like the same proportion as the power.

"Speaking of the earlier 'Dreadnoughts,' of which we have now eight ships in commission, the average cost of these ships was £1,710,000 each complete with guns and everything, including armour. It includes the cost of the ship when it is commissioned, but not Reserves. We have been accustomed to hear sometimes in this House, but more often in the Press and from a great many reports that reach us from abroad, that when the *Dreadnought* was first invented it represented such a great leap in cost that the whole Navies of the world were revolutionised, and that the British Admiralty were responsible for putting naval expenditure on an entirely different standard. What are the real facts? The 'Dreadnoughts,' the eight battleships now in commission, cost, as I have said, £1,710,000 apiece. The cost of those eight battleships is precisely the same to build as the cost of nine 'King Edwards.' But the unkeep of the eight 'Dreadnoughts' costs £50,000 less a year than the upkeep of the nine 'King Edwards.' Let any hon. Member ask any distinguished Admiral he likes whether he would rather command a Fleet of eight 'Dreadnoughts' or of nine 'King Edwards,' and I should be surprised if he does not say that he would prefer to have the eight 'Dreadnoughts' with their possible eighty 12-inch guns, their speed of twenty-one knots, and their very considerable armour protection, to the nine 'King Edwards' mounting thirty-six 12-inch guns with a very

much lower speed. But if he says he would prefer the eight 'Dreadnoughts' I must remind the House he would be saving £50,000 as well, so that upon the two counts we must conclude that as an engine of warfare the 'Dreadnought' is an economy as compared with the 'King Edward.'

"I turn to a later type than the *King Edward*. I turn to the *Lord Nelson*. There are only two 'Lord Nelsons' built, but, taking into account the actual cost of those two, I find that I can get thirty 'Lord Nelsons' for the cost of twenty-nine 'Dreadnoughts.' And that the cost of the twenty-nine 'Dreadnoughts' to maintain would be £15,000 a year less than the cost of maintaining thirty 'Lord Nelsons.' You can appeal to any expert whether he would rather have a fleet of twenty-nine 'Dreadnoughts' or of thirty 'Lord Nelsons,' and I think as in the previous case there can be but one answer, that as an instrument of economy as well as of warfare the *Dreadnought* is an improvement upon the *Lord Nelson*. I am quite disinterested in making these statements. Neither the Board of Admiralty with which I am now concerned nor any Board of Admiralty with which the present Government was concerned had anything to do with the laying down of the *Dreadnought*. The credit is due to the Board of Admiralty of the day, and they deserve the fullest credit for having had the courage to introduce a type of ship which is far more effective as an instrument of warfare, and at the same time is more economical than the types which it supplanted.

"Now I turn from the earlier 'Dreadnoughts' in commission, the eight battleships now in commission, to the later type of which the *Orion* is the forerunner.

That type covers, with slight alteration, all battleships laid down at the present moment. The cost, with the guns, approximates to £1,900,000 or an increase of £200,000 upon the earlier type of 'Dreadnought.' The House must remember, in justification of this increase of £200,000, that an increase of £500,000 in cost of new ships had been made across the ocean, comparing the ships laid down by Germany in 1907 with those laid down in 1908; and I do not think that hon. Members can charge the Board of Admiralty with having been extravagant in making what is comparatively speaking such a small increase in the cost of ships.

"I do not wish to enter into the question now of primary and secondary armaments, either as to the merits or the demerits of the secondary armaments or as to the cost. But I would merely make this incidental remark, that if we had been able to obtain ships of their great power like the *Orion*, and at their comparatively low cost, it is due to the fact that we have not got what is generally spoken of as the secondary armament. We have only anti-destroyer armour, but no secondary armament that can be used on the broadside in battle, and by suppressing the secondary armour we are enabled to get at less cost a very material increase of power in our primary armaments.

"On these questions of naval policy, perhaps, it is always difficult to be certain, but I think there are good grounds for believing that the Admiralty which in 1905 adopted the principle of primary armament only was right, and I have never had any hesitation in supporting the policy introduced by my predecessors. I am rather

afraid that when I show how comparatively cheap our ships are, and how we have not made that gigantic increase of expenditure on shipbuilding with which we are charged, I shall be told that I am proving too much. It will be said to me, 'You get your ships at so much less than other people, you are satisfied with their power, but how comes it that nevertheless you are asking for £44,000,000, the total of your expenditure, as compared with £22,000,000, the total amount demanded for the ensuing year by the second Naval Power in the world; surely you must be asking for more than the two-Power standard when you are doubling the strength and you are asking for double as much as the second Naval Power?' But you must compare like with like. It is true that I am asking the House for £44,000,000 and that the German Naval Estimates for the ensuing year are £22,000,000; but I think that if the House examines the Estimates they will agree that these totals do not represent comparable quantities."

After making various deductions amounting to £8,000,000, Mr. McKenna proceeded:—

"I reduce for comparative purposes the £36,000,000 to £33,500,000 which can be properly compared to the German £22,000,000. I admit that it is a heavy demand to make upon the taxpayers of the country to ask them for £33,500,000 when the next strongest Naval Power is only spending £22,000,000. I admit the amount is large, but I do not think that it is necessary for me to remind hon. Members, or to appeal to them to remember that the importance to the maintenance of our supremacy by our keeping open the highway of the ocean, is so overwhelming that not merely must we be in a position of

safety in a protracted struggle, but that we cannot afford to be in doubt for a fortnight.

“There was a recent publication by an old friend of mine, whom I highly esteem, Lord Eversley. It was in many respects moderately written; it contained considerable wealth of detail in support of the general charge that the demands made by the Admiralty were extravagant, and that we ought to be called to book for the grossness of our expenditure. I selected out of that publication the first statement which caught my eyes. It was this: that in 1897–98 the expenditure on coal for the Fleet was £525,000, and that in 1910–11 that expenditure had risen to £2,329,000, which was more than fourfold. That struck me so strongly, so severely, that I investigated it at once. It appeared to be monstrous that we should be spending four times as much on coal as we were content to spend thirteen years ago. Lord Eversley rightly pointed out that in such circumstances there must be waste. What are the facts? First of all, between 1907 and 1910 there was a change of system in preparing the Estimates. What appears under the heading of fuel in 1910–11 includes not only fuel, but such items as lubricating oil, bags and sacks, and other materials, reducing the amount by no less than £493,000. None of those items appear in the corresponding figures for 1897, so that the total of £2,329,000 has, in the first instance, to be reduced to £1,836,000.

“The Admiralty cannot be held responsible for the price of coal, and I feel therefore perfectly justified in making a comparison in the prices of coal. Coal was 25 per cent. cheaper in 1897 than in 1910, so that we have to take 25 per cent. from the cost of the coal. I

take off nothing for the cost of petrol and oil fuel, but taking only 25 per cent. off the coal cost, the sum of £1,800,000 is still further reduced to £1,436,000. Now we have a comparison of £525,000 in 1897, with £1,436,000 in 1910. We must not stop there. The year 1897 was a selected year. The figure was very low in the Estimates, and so low that there had to be a Supplementary Estimate, or if not a Supplementary Estimate there was money transferred from one vote to another with the consent of the Treasury, and so appears in the Appropriation Accounts. The actual amount spent in that year was £807,000, so that the true comparison is £800,000 with £1,400,000, or an increase of 80 per cent. instead of a fourfold increase.

“We have got now to compare the fleets. The increase in horse-power in 1910 over 1897 is nearly fivefold, and certainly over fourfold, so that with 80 per cent. increased expenditure on coal we are running nearly five times as great horse-power. I do not think that that story is evidence of such gross waste and extravagance as hon. Members who may have read Lord Eversley's pamphlet would have been disposed to believe.

“Let me turn again to the programme. As I have said, it includes fifty-one armoured ships, there are four of what are called small cruisers. Why they are named small cruisers, these ships, one of which is over 4000 tons and the other 5000 tons, I do not know; but it is the habit in relation to the larger ships to call them small cruisers. There are three of the *Bristol* class, and one of the *Boadicea*. These ships take about twenty-one months to build, and I am happy to say we have no

delay from any of our contractors in any respect. We have, as well, twenty destroyers, which will be probably laid down about the month of July, and will take from fifteen to eighteen months to complete. We have also six submarines. The programme thus will give us, in the spring of 1914, thirty ships, battleships, and cruisers of the type which are now described as 'Dreadnoughts.'

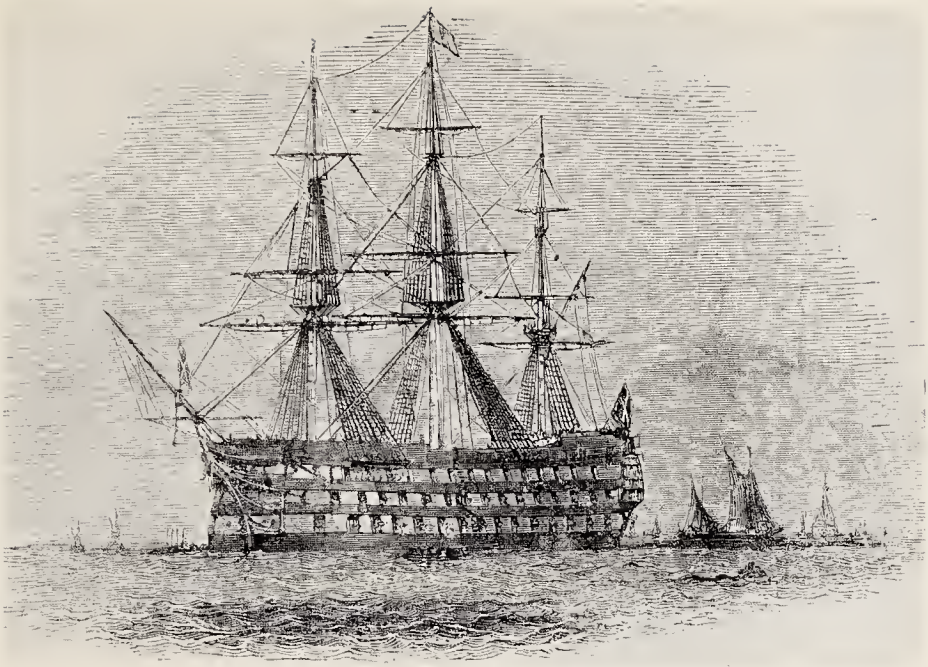
"There is a natural unwillingness to part with old friends, but it is necessary at all times to keep a constant watch upon the older vessels in order to scrap them when they are not really worth their cost. The large reduction in the Navy Estimates in the year 1905-6 could never have been obtained to the same extent by any other possible means whatever. What are we doing in that respect? During the Financial Year 1911-12, we shall be able to reduce the number of ships in commission by seven, five 'Royal Sovereigns' and two others. The number stated by my hon. Friend of pre-'Dreadnoughts' at the time he (Mr. Murray Macdonald) spoke was fifty-one; as a matter of fact, the figure ought to be reduced to forty-eight. There are only forty-eight at present, and that number will in the course of the year be reduced to forty-one. I mention those figures now only to remind the House that the Board of Admiralty have this policy very closely in view.

"I cannot make any forecast at the present time as to how much further we shall scrap in the years 1913 and 1914, because it must depend upon the number of older ships which are retained by other navies; but I assume that other navies will be compelled by cost to

follow the same policy as we have adopted, and that we shall be able to make still further material reductions in the older ships as our newer 'Dreadnoughts' come into commission."

The statement of the First Lord of the Admiralty was one of the most momentous ever put before the House of Commons. It indicated clearly the amazing development in battleship design, and set another lead for Continental nations to follow. Their business is not to originate; but to copy. In that respect at least Great Britain has remained supreme. She has set the pace in battleships from the beginning of the modern first-class fighting ship era, and other nations have had no option but to follow. Germany, in particular, has replied with grim and restless energy, inspired by a monarch who, in spite of much gasconading, has laboured ceaselessly and successfully in connection with both his Imperial Navy and his mercantile marine. A few years ago, Germany was unable to build an express Atlantic liner or a battleship; to-day she can turn out both with completeness and dispatch. Only the test of battle can prove whether thoroughness has kept pace with quickness; but there is reason to believe that there is not in German construction that reliability which is associated with the best British workmanship.

The amazing growth of modern naval armaments has been shown by the speech of the First Lord of the Admiralty; also the almost incredible development in fighting power. The *Dreadnought* outclassed and scrapped all the battleships afloat; the *Orion* has a broadside fire which is practically double that of the *Dreadnought*, so that the *Dreadnought* is as helpless



THE OLD SHIP-OF-THE-LINE, CAMPERDOWN.



H.M.S. CAMPERDOWN, WHICH RAMMED AND SANK H.M.S. VICTORIA.

against ships of the *Orion* class as the *London*, *Majestic*, *Africa*, and *Queen* would be in opposition to the *Dreadnought*.

To keep the British Navy adequately going, more provision than the Royal Dockyards give is needed—far more provision, for the Government's own resources are totally inadequate to meet modern naval demands. That is the case with Germany, America, and indeed all nations. Outside help on a vast scale is essential, and so it happens that we have colossal works like those at Elswick, and other great yards on the Clyde, at Barrow and at Blackwall. Apart from shipbuilding firms there are four firms who are capable of supplying guns of 11-inch and above, five firms capable of supplying armour-plates, and three which can furnish gun-mountings for heavy guns. It is the custom to check, when possible, the prices paid to these firms with the cost of making similar articles in Government establishments; and every effort is made to keep the price of armour-plates within fair limits.

The battleship-cruisers of the *Lion* and *Princess Royal* class are an advance on the armoured cruisers of the *Invincible* type. The latter have a speed of 25 knots (one of them, the *Indefatigable*, of 19,000 tons, is said to have exceeded 29 knots), length of 530 feet, beam of 78½ feet, draught of 26 feet, and a formidable armament of eight 12-inch and sixteen 4-inch guns. The cost of each of these huge and powerful warships was £1,725,000.

Assuming that Great Britain, Germany, and the United States have each completed their 1911-12 programme by 1st April 1914, each nation will have com-

pleted the following number of "Dreadnoughts" and "Invincibles":—

	GREAT BRITAIN			
Dreadnoughts	.	.	.	22
Invincibles	.	.	.	9

The latter figure includes one "Invincible" building for Great Britain at the charge of the New Zealand Government; but it is exclusive of one "Invincible" building for the Commonwealth of Australia.

	GERMANY			
Dreadnoughts	.	.	.	16
Invincibles	.	.	.	5

	UNITED STATES			
Dreadnoughts	.	.	.	12
Invincibles	.	.	.	0

The number of pre-Dreadnoughts less than fifteen years old which will be possessed on 1st April 1914 by Great Britain, Germany, and the United States, and the number less than twelve years old, are:—

UNDER FIFTEEN YEARS OLD				
Great Britain	.	.	.	23
Germany	.	.	.	18
United States	.	.	.	16

UNDER TWELVE YEARS OLD				
Great Britain	.	.	.	12
Germany	.	.	.	10
United States	.	.	.	13

With such a vast capital expenditure on the Navy, it follows that there must be a heavy outlay on the repair of ships alone, and on the other services such as Royal naval barracks, colleges, boom defences, etc.



H.M.S. *TRAFALGAR*.



H.M.S. *RENBOW*. SHOWING ONE OF HER ENORMOUS GUNS.

Battleships have never been built with greater disregard to cost than at present, and they have never been more ruthlessly dispensed with. The coming of the *Dreadnought* made obsolete an entire fleet of battleships, some of which were splendid examples of design and construction. Slowly at first, then more rapidly, these vessels went out of commission, and almost immediately were sold out of the service.

In the autumn of 1911 eight battleships, obsolete and obsolescent, were at Plymouth waiting to be sold by auction, and others were lying at the Motherbank and elsewhere. All battleships which are no longer required are sold by auction at stated periods, with other obsolete vessels. They are bought solely for breaking-up purposes, and it is a condition of their purchase that they shall not be employed for warlike operations. As a matter of fact, before being offered for sale battleships are made useless and deprived of their guns. Foreign firms are very anxious to acquire old British battleships, which contain enormous quantities of valuable metals, and occasionally a famous ship eventually goes abroad, although the actual breaking-up may be done in England. Amongst recent battleships to be broken up on the Thames were the *Ajax* and the *Thunderer*. The prices paid at auction for battleships varies, but averages about £20,000. The *Camperdown* was sold at Devonport for £28,000; the *Benbow* fetched £21,200; the *Trafalgar* was sold for £29,500, and the *Anson* realised £21,200.

The French have pursued the same policy as Great Britain in disposing of old warships; but not on the same scale. As a matter of expediency, and perhaps

sentiment, they have retained some of their ships for a longer period than ourselves; yet of late, vessels that were famous in their day have been sold, amongst them the battleships *Magenta* and *Amiral Baudin*. These two vessels, with a cruiser, two destroyers, four submarines, nine torpedo-boats, and a dispatch-boat, nineteen obsolete ships in all, were sold in 1911 to a Paris firm for £67,500.

The annual cost of maintaining a modern battleship is very heavy. For a ship of, say, 13,000 tons, the Secretary of the Admiralty, in 1904, gave the following figures, which, of course, are now considerably exceeded:—

Full pay, wages, etc., of officers and crew	£40,369
Victualling	14,604
Coal	23,600
Stores and repairs	9,548
Naval Ordnance stores	5,500

Or, in round figures, a total cost of £94,000

Time alone will show whether the battleship will retain dominion of the sea or whether future wars will be decided in the air. With unexpected suddenness the airship and the aeroplane have been proved to possess many practical features, and with the launch at Barrow in May 1911 of the first naval airship Great Britain entered upon an era of development which will doubtless prove as far-reaching as the effects of the *Dreadnought*. Great difficulties were experienced in connection with getting this monster craft afloat and ready for service. Several mishaps occurred, even the falling of one of her crew on to her framework,



Sir W. G. Armstrong, Whitworth & Co., Ltd.

A DREADNOUGHT IN DRY DOCK.

while clambering over the balloon, was enough to damage her and delay the final launch, and there was prolonged trouble in securing the necessary supplies of hydrogen for the purposes of inflation.

According to the description given of the airship by the special correspondent of the *Times*, her hull was exactly 512 feet long. It was slightly blunt at the bow and tapered away finely at the stern, being, as a matter of fact, precisely in the "stream line" form found most suitable for minimising wind resistance by the tests of the National Physical Laboratory. The framework of the hull, constructed of "duralumin," was sheathed completely with a special fabric. This was waterproof and gas-tight, and had been treated externally with a paint which resists the action of light and protects the gas-containing balloonettes from expansion and contraction due to atmospheric changes. In colour the hull was a metallic silver grey upon its upper half and had a yellow tint on its lower side. This contrast in colour was caused by a variation in the treatment of the fabric, the light rays from above and the damp from off the surface of the water being resisted by two different processes.

The framework was so arranged that the hull of the airship was twelve-sided. In the framework were the seventeen balloonettes, each one being in a separate compartment. Altogether they contained more than 700,000 cubic feet of hydrogen, with a lifting effect equal to 21 tons. The two gondolas were each about 25 feet in length, and were made of polished wood. They were suspended fore and aft, close up under the hull by means of metal rods, and were connected by a

covered-in passage-way, which provided in its centre the quarters of the airship's crew.

In each gondola was a Wolseley-Siddeley petrol motor developing 200 horse-power. Three propellers in all drove the airship. On either side of the fore gondola was placed a four-bladed propeller, while a two-bladed propeller, larger than either of the others, was fixed immediately behind the rear gondola. A clutch mechanism was fitted in connection with both power plants, so that the engines might be run without actuating the propellers.

The control of the airship was effected by means of a series of horizontal and vertical rudders which had the appearance of box-kites. To obtain upward and downward movement were four sets of horizontal rudders, two attached under the vessel's bow and two others on either side of her stern. Lateral movement was obtained by three more sets of planes arranged vertically. Two of these were placed above and below the stern, and a third—smaller than the other two—under the hull just aft of the rear gondola. The airship also had four fixed planes or fins at her stern to increase her stability. As she lay on the surface of the water the lifting effect of the balloonettes was neutralised by a quantity of water ballast which was carried in tanks in the lower portions of the gondolas. When an ascent was made the water was gradually pumped out of the tanks, until the dirigible became lighter than air.

The vessel's crew of nine comprised, in addition to two officers, two petty officers, two engineers, and three able seamen. One of the seamen was an expert photographer. A series of tests which were made with



Sir W. G. Armstrong, Whitworth & Co., Ltd.

H.M.S. MONARCH. THE LAST TURNABLE GOING ON BOARD.

her propellers, and careful calculations as to the resistance offered by her hull, indicated that her speed through the air should be 40 miles an hour.

The cost of this notable craft, which was officially known as Naval Airship No. 1, was:—

Hull and Machinery	£40,876	17	6
Spare Gear	681	3	5
Total .	£41,558	0	11

The advent of the naval airship had been watched with eagerness by the public as well as by those more intimately connected with the Admiralty. The vessel had been constructed with the greatest secrecy, and her building had extended over a prolonged period. It was known that many serious difficulties had been encountered, but the country was given to understand that these had been overcome. The preliminary attempts at a successful launch had not been successful, and consequently the utmost interest was shown in the launch of the vessel towards the end of September 1911.

Early one morning the delicate structure was removed from the enormous shed in which it had been housed, but no sooner was the airship clear of the building than it collapsed and broke into two pieces. The vessel's crew narrowly escaped destruction. The wreckage was recovered as far as possible, and presumably efforts were restarted immediately to repair or reconstruct the ship of the air, the purpose of which is to be the destruction of the ships that float on the sea.

So far nothing like success has been achieved with airships for naval purposes, and it is doubtful whether any structure on existing lines can be evolved that

will be able to take its place as a unit in naval warfare. In the most favourable circumstances a naval airship can be of use only in the calmest weather and for observation purposes. She might be able to discharge high explosives which would destroy or cripple a battleship, but to do so she must be able to perceive her target. If she succeeded in doing that, her opponent would easily detect her huge outline in the air, and such an object would in all probability be swiftly destroyed.

There can be no regret if failure attends the efforts to produce successful naval airships. Modern warfare became more hideously involved than before by the appearance of the submarine, whose reason for existence is to slip stealthily below the water and discharge a weapon to annihilate a magnificent ship that has cost more than two millions sterling and carries nearly a thousand officers and men.

There is something repellent in the employment of aerial and submarine vessels, and no honest fighter fails to deplore their introduction into warfare. In the case of a successful submarine attack a modern mammoth has no chance whatever, and so far as her guns and armour are concerned they might as well be in their original state of shapeless steel.

The vast extent to which naval rivalry has grown is shown by a return issued by the Admiralty. The period covered is 1901-11, and relates to the principal naval powers. The return shows the total estimated naval expenditure in each of the ten years, with the sums set aside for new construction and armament, and details of construction actually carried out within the

period. The following table gives the growth of total expenditure, and the strength of the personnel of each Navy :—

	Total Expenditure.		Personnel.
	1901.	1911.	
	£	£	
Great Britain	30,981,315	44,392,500	134,000
Germany	9,530,000	22,031,788	60,805
France	13,802,266	16,705,382	58,649
Russia	9,359,766	13,270,376	46,655
Italy	4,912,661	8,379,940	30,587
Austria	1,821,284	5,152,382	17,277
United States	16,012,438	26,584,571	62,283
Japan	4,485,892	8,803,015	49,389

In the last three years the amounts voted for new construction, including armaments, have been as follows :—

	1909.	1910.	1911.
	£	£	£
Great Britain	11,227,194	14,957,430	17,566,877
Germany	10,177,062	11,392,856	11,710,859
France	4,517,766	4,977,682	5,876,659
Russia	1,758,487	1,424,013	4,318,045
Italy	2,190,707	2,181,200	2,277,302
Austria	1,908,331	1,583,333	3,125,000
United States	7,976,897	6,889,005	5,343,789
Japan	2,392,483	2,748,349	2,997,493

In the following further table is shown the amount of new construction, that is, the tonnage, when completed, of vessels launched during the years named :—

THE BATTLESHIP

	1908.	1909.	1910.
Great Britain	77,202	92,957	176,582
Germany	104,971	83,184	101,830
France	21,205	96,308	21,860
Russia	1,834	4,371	6,130
Italy	21,021	2,404	19,642
Austria	16,034	37,122	16,384
United States	69,341	80,822	75,935
Japan	1,620	Nil.	43,900

For 1911 no figures are available for foreign countries, but British warships launched during the current financial year will have a total tonnage of no less than 223,820.

A Parliamentary Paper, published in May 1911, showed all the battleships and armoured cruisers, etc., of the navies of Great Britain, France, Russia, Germany, Italy, the United States, Japan, and Austria-Hungary, which were not over twenty years old on 31st March 1911. Great Britain had 53 battleships built and 10 building; the other figures for battleships built and building being: France, 17, 8; Russia, 7, 7; Germany, 32, 9; Italy, 9, 4; Austria-Hungary, 11, 5; United States, 26, 9; Japan, 15, 2. These figures give totals of 173 battleships built and 51 building.

There are indications that finality in size has been attained in Dreadnoughts, the monsters which have been evolved on the Thames, Tyne, Clyde, at Barrow and in Government yards. It seems equally evident that there cannot be much improvement on the present type of all-big-gun ship. There may, and doubtless will, be a revolution in propulsion, and probably the day is not far distant when there will be a disappearance

of the familiar funnels which, with all their faults, give such a finished aspect to a steamer. What would the *Mauretania* and *Olympic* be without their imposing and splendid smoke-stacks? In the same way it is hard to picture the modern mammoth without these enormous structures, so suggestive of power and dignity. There is no doubt, however, that the funnel in the near future will cease to be.

The masts and sails of old died hard; yet they have vanished, and such canvas as remains is used for hammocks and awnings or as protective material for funnels, guns, and decks. Everything to-day is ruled by expediency and utilitarianism, and when coal ceases to be employed as a steam-raiser then funnels will be no longer needed, and we shall enter upon the era of the huge and mastless hull, which will be simply a floating gun-platform. At present, masts are needed for fire-control, observation, and directing purposes, as well as for the employment of wireless telegraphy, and funnels of vast dimensions are essential owing to the use of coal for raising steam; but science moves swiftly, and the accepted of to-day is the rejected of to-morrow.

Experiments with oil fuel and internal combustion engines have proved the efficiency of these methods of propulsion, and with quick development in these directions there is reason to expect that there will be evolved a perfect type of internal-combustion engine which will be able to propel at a great speed even the modern mammoth. The new creation may not be beautiful, but no consideration of art affects, nor should it influence, the designer of the modern fighting machine. Efficiency is the sole result to be achieved, and in latticed masts, super-imposed turrets, stripped hulls, vanished stern-

walks, and other eliminations and improvements, we have seen the beginning of a new era of utility and power. Yet there is impressive majesty even in the hideousness of the modern mammoth, just as there is beauty in repulsive bulldogs.

Great Britain alone, of all the nations, France excepted, gives an opportunity of contrast between the very old and the very new. She has her *Victory*, the oldest battleship in the world on the active list, incomparable, unapproachable, unchallenged Lady of the Waters; she has her Dreadnoughts, superb, majestic leaders of the world's great fighting-ships, originators of every mammoth of enormous cost, bewildering and baffling complication; an amazing contrast with the structure which in some of her essentials is the same as the *Great Harry* of four hundred years ago.

Any time, day or night, you may stroll along the Hard or on the batteries at Portsmouth, and see the vessel which represents the greatest glory of the wooden battleship; and not far from her you may look upon the last and most malignant type of all-big-gun ship. You have the oldest and the newest; the ancient structure of decaying oak, with her hemp, trunnioned guns, and tottering poop-lanterns; and the mighty mass of steel with vast machinery, stupefying power, blinding search-lights, and constant touch with every part of earth and sea.

In the one case you have history made and known. The *Victory* sleeps at anchor, standing for the valiant things that have been.

The Dreadnoughts ride as peacefully, grim secrets of incredible potentialities.

What will their harvest be?

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